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The RAINBOW

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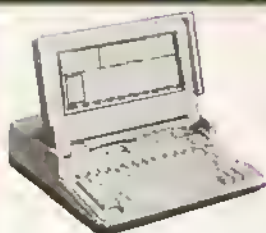
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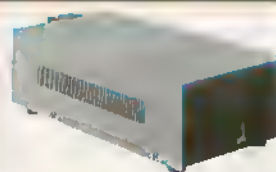
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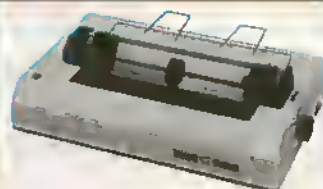
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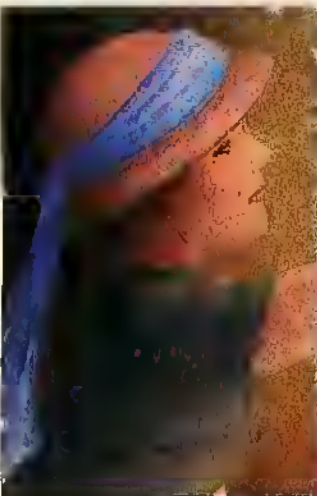
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Editor:

I would like to caution the CoCo Community about Trojan Horse, or virus, software. Virus software is designed to be unnoticeable when it is loaded from cassette or disk into a computer, while it slowly destroys the computer system. Viruses automatically start to change the data inside the computer. If a virus is in the computer system when someone saves a program to tape or disk, the virus "reproduces" by copying itself with the program, leaving just enough of itself to wreck the system.

Anyone with a computer at home, school or office is at risk, as are the nation and the world. Whole computer networks have been terminated because of virus software. Imagine what could happen if just one bank in the U.S. became a victim to virus software!

One way to check for a virus intrusion is to look at the time and date tables for each program on a disk (if these tables are available to you). A virus will instantly attack the time and date a program was saved to disk.

I certainly hope that the CoCo Community will be on the lookout for virus software. If the Community can pull together, maybe we can put an end to Trojan Horse software.

Janie Stafford
Norton, OH

HINTS & TIPS

Editor:

My CoCo 3 had an overheating problem after I installed the 512K upgrade board. First I was told to use a fan to cool the computer. This seemed to solve my problem. Then one day I turned on my computer and got only a green screen. There was no sign-on message and no keyboard response. Pressing the reset button had no effect, either.

I took the cover off and removed the 512K RAM board, turned it over and noticed all the joints were cold-soldered. I resoldered all joints on the board, replaced it, and all is well. I don't even need a fan anymore.

Brad Stein
Winnipeg, Manitoba

A Subroutine Change

Editor:

I have tested the Hi-Res Joystick Interface M1 subroutine [February 1988, Page 122] on my CoCo 2. It works very well with a simple one-byte change.

The first instruction is equivalent to the high-speed poke. It doubles the clock speed to make the routine more responsive. However, it is programmed for the CoCo 3, which goes high-speed when poked at &HFFD9. You must change it to &HFFD7. Simply POKE &H7F02, &H07 after the M1, is in memory. If you are loading from DATA statements, change the third byte to D7.

Of course, the values returned are the coordinates for the CoCo 3 Hi-Res screen, which has 640 dots horizontally. To change the X-value to correspond to a 256-dot resolution, divide by 2, then set the result to 255 if it is greater.

If the high-speed clock causes any problems in your program (for example, if you are using the printer), simply POKE &HFFD6, 0 after the subroutine call.

Duane M. Perkins
Mt. Gretna, PA

Text Fix

Editor:

I've noticed that TW-80 (my version anyhow) won't load anything other than an ASCII text file. This means it won't load an ASCII BASIC program or anything else without that filetype attribute.

I require this capability since I often include samples of BASIC code in my correspondence. I also consider it an annoying restriction.

Here's a fix in case you have that problem, too. Do this with a backup copy of your configured TW-80 disk:

```
LOADM "DISKMENU"  
PRINT (HEX$(PEEK(&H2B85)))
```

If the computer returns a 27, continue on. Otherwise, stop now, since your version isn't the same as mine.

If it returns 27 then

```
POKE &H2B85, &H20  
SAVEM "DISKMENU", &H2000,  
&H3B1B, &H2000
```

Mike Ward
Coral Gables, FL

Converting the CM-4 RGB

Editor:

Your readers should be aware that many Radio Shack products are discontinued each year and that these SOWG (Sold Out When Gone) items are offered at incredibly reduced prices. For example, I bought a CD player (Model 2200) for \$79!

I also picked up a CM-4 RGB monitor for \$59. This unit originally sold for \$299, and there may still be some around.

To convert it to a CoCo 3, you need to order the CM-8 monitor cable from Tandy National Parts (about \$8). You also need the nine-pin female connector 276-1538 (\$2.49) and hood 276-1539 (\$1.99).

Hook up as follows:

CoCo 3	to	CM-4
7	2	Ground
1	3	R
2	4	G
3	5	B
5	8	Vertical sync
6	9	Horizontal sync

The CM-4 doesn't have audio, but for 60 bucks, who cares! The picture looks great!

Bob Ocean
Santa Rosa, CA

KUDOS

Editor:

Thanks to James A. Upperman for providing the excellent child protection program in the April 1988 issue of THE RAINBOW. Such a program is desperately needed in the world in which we live.

Using his example, the pediatrician for whom my wife works has implemented just such a standardized form. I'm sure that minor children everywhere will benefit.

Don Hutchison
Atlanta, GA

Support for the End User

Editor:

I recently had problems with two programs in your magazine. One was VCR Tapes, by Randy Mayfield, from the December 1987 RAINBOW (Page 92). The other was "Appointment Calendar" by Bill Holdorf (January 1988, Page 100). In both cases, I was able to contact the authors and explain my problems. Mr. Mayfield not only helped correct the problem, he sent a copy of an update. Mr. Holdorf also was very helpful; he, too, sent a copy of an update.

I recently sent for a program reviewed in one of your earlier issues — TOMELA*Co's Bowling League Secretary by Tom Bennett. I was having trouble getting it to print on my DMP-105 and contacted him. He worked with me and now it prints just fine.

I am sure you receive many letters from people saying the same things about other authors. It seems that just about all who publish or advertise a program in your magazine, whether individual or small company or large, seem to go the extra couple of miles to be of help.

Lastly, thank you for a very "user-friendly" magazine. I seem to go through my copy each month faster and faster. I then chomp at the bit until the next copy arrives. Thank you, Mr. Mayfield, Mr. Holdorf, Mr. Bennett and RAINBOW, for "making my months."

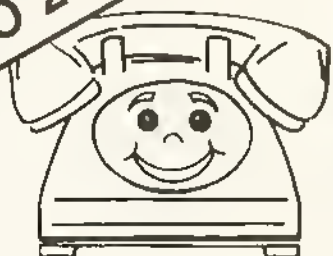
Richard Mullicane
Rancho Cordova, CA

INFO PLEASE

Editor:

I am a legally blind man with a cassette-based CoCo 2, which I purchased for use here at AEB (Arkansas Enterprises for the Blind). I have bought the Speech/Sound Pak to help me enter programs, with the

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Phyllis.

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hopes that it would allow me to type in lines of a program and have it echo text and error messages back to me. I am not able to read listings of long programs and type at the same time. Is there a machine language program that will work like *Echo* on the Apple?

I would also appreciate more information on machine language programming and any machine language projects to help me get started on the 6906E microprocessor. Radio Shack has no books available on the subject. I am ordering an assembler, but I need more than that. I need to see some ideas for programs and possibly more tips and tricks.

Mike Dalete

2811 Fair Park Boulevard
Little Rock, AR 72204

While it isn't exactly what you are looking for, Mike, check out "Yakety-Yak the CoCo Talks Back" (October 1987, Page 106). For assembly language, we refer you to the TEPCO advertisement for Assembly Language Programming for the TRS-80 Color Computer and William Nee's series on assembly language which begins on Page 100 of this issue.

Patch Needed

Editor:

A couple of years ago I purchased a graphics draw program called *VIZIDraw* that was a fine value for its cost. It was sold

by GRAFX, P.O. Box 254-W, Millin, PA 15122. Since purchasing the CoCo 3, I have not been able to run the program. I have many important graphics pages saved and would like to see them again. Does anyone know of a patch for this program?

I have not had any success contacting the parent company. Perhaps it is no longer in business. Any help would be appreciated. I would very much like to buy the new *CoCo Max*, but I just don't want to forget all the graphics I have saved now.

Richard W. Zawatzke
6331 Taylor Ave.
Racine, WI 53403

Converting the Stick

Editor:

Where can I get an Atari-to-Color Computer joystick adapter and how much will it cost?

Clifford Lingle
7125 Glenwood
Overland Park, KS 66204

Copying Problems

Editor:

For some time now I have been looking, with no success, for a way to print out a hard copy of my *Micro Illustrator* files. One of my biggest difficulties is having almost no experience with OS-9. Is there any help for me, or am I just out of luck?

Also, just this year I purchased a disk

drive; while converting my files to disk, I encountered a few problems. I can't seem to save *Machness and the Minorant*, *Raaka-Tu* or *Pyramid*. When I try, I get an error. I've tried to save them with a terminal program, but when I try to load each program back to run it I get an FS Error. What do you suggest?

Also, I'm having trouble copying some of my ROM packs. I've followed the instructions from an older issue, but they don't seem to work on *Roman Checkers*, *Personal Finance II* and a few others. Is there any other way?

Paul A. Fritchett
Pleasure Bay, Apt. 6
Long Beach, NJ 07740

CoCo Record-Keeping

Editor:

I own a small exterminating company with about 75 customers. I would like some information or help in getting a program like some other exterminators' that is compatible for my Color Computer.

I have the CoCo 3 with 512K memory, two disk drives and a DMP-100 printer. I like this computer and don't want to get rid of it to get an IBM compatible, but due to the amount of writing I do to keep records and to fill out invoices and work orders, I may have to go this route.

I really hope you can help me.

Michael S. Rielman
107-67 92nd Street
Ozone Park, NJ 11417

To BBS or not to BBS

Editor:

I am considering a hard disk and an auto-answer multi-baud modem for my 512K CoCo 3. I would like to set up my system as a 24-hour BBS, running under OS-9 Level II, but I do not want to lose the use of it for other things under OS-9. Also, I would like to be able to tailor the BBS to my needs and change it as I see the need. I would appreciate any comments, suggestions and information about software and hardware to accomplish this.

Andrew Casier
10213 19th S.W.
Seattle, WA 98146

PEN PALS

• I am 10 years old and looking for a pen pal aged 7 through 15 who likes sports or playing games on the computer. I have a CoCo 3 and two disk drives.

Eddie Roginski
RD #1, Box 216
Mertztown, PA 19539

• I have a CoCo 3, FD-501 disk drive, DMP-130 printer and a cassette recorder. I am 14 years old and would welcome letters from all over the world.

Frank Ferrara
27200 Saint Ann
Warren, MI 48093

• I am 21 years old, have a CoCo 3, DMP-106 printer and CCR-81 cassette recorder. I am a Mexican student and would like to have pen pals from anywhere in the world.

Umberto Jimenez Yee
1933 D. Ave.
Nixonville, CA 92050

• I would like to get to know some nice people who want to be my pen pal. I have a CoCo 3 with a Radio Shack disk system. I am 16 years old and I speak more French than English.

Lauren Timlet
3655 Ridgwood
Apt. 406
Mantoloking, CA 91754

• I'm 10 years old and have a CoCo 3 with printer and disk drive. I would like to have pen pals from all over the world.

Andrew Pinkston
Box 1228
Blind River, Ontario
Canada P0R 1B0

• I am basically a game and sports fanatic, not much interested in technical or programming stuff. I'm in my 30s and love to play with my CoCo 2 and disks. I need some help with some Adventures and will help you with improving game scores. Write soon.

J. K. Glass
410 E. Park Ave.
Long Beach, NY 11561

• I'm 15 and have a CoCo 3 with a disk drive, and I'm looking for pen pals (with a CoCo 3 and disk drive) all over the world (especially Canada). I love music, graphics and Simulations! Also, I'll answer all letters.

Reidrick Chirk
15215 Chaseridge
Missouri City, TX 77489

• I would like to have some pen pals anywhere in the U.S. I am 14 years old and have a 64K CoCo 2, a printer and a disk drive.

Andrew Cooper
311 Fern Drive
Aven, NJ 08004

• I am 16 years old and would like pen pals. I own a 64K CoCo 2, a 128K CoCo 3, two FD-500 drives, a CM-8 monitor, Multi-Pak Interface and DMP-105. I am interested in OS-9. Oh, one thing: Pirates, don't waste your stamps!

Heath Dingwell
RR #2, Box 230
Litchfield, CT 06759

• I am 36 years old and have the CoCo 2 with tape system. I just sent for the 64K upgrade. This is all new to me, but I love it. I would love to hear from pen pals of any age.

Freddie Finch
RFD #2, Box 140B1
Ellsworth, ME 04605

• I'm 42 years old and enjoy horsing around with my computers, a Model III and a 64K CoCo with two drives, a graphics pad, DMP-105 and a Multi-Pak. I've done just about everything to these puppies but paint a sports stripe down the side of them. I know some German and Spanish and a microscopic bit of Russian and would like to correspond with anybody anywhere in any of these languages. No parameter/limits on age.

Richard Overstreet
3724 Broadway, Apt. 605
Kansas City, MO 64111

• I am 27 years old and have a CoCo 3. I am interested in pen pals who would like to develop strategy games for the CoCo 3. I work as a graphics design artist.

David Rulbright
1015 Muscatine Ave.
Iowa City, IA 52240

10 p.m. to 10 a.m. each day, plus additional hours posted on the board. The system supports 300 and 1200 baud and can be reached at (513) 251-4472.

Floyd Resler
2834 Lehman Rd.
Cincinnati, OH 45204

• I am happy to announce the arrival of my board, CoCo Brothers BBS (CBBBS Version 2.1A). It is currently running at 8-N-1, 300/1200 baud. Call between 9 p.m. and 9 a.m., C.S.T. at (501) 562-4312.

Chris Bygnor
8701 I-30
Little Rock, AR 72209

• I would like to announce a new BBS in the Marysville and Yuba City calling area. 09-Online BBS is my own BBS software running under OS-9 on a 512K CoCo 3. It is up 24 hours a day, 7 days a week at (916) 742-6835. The parameters for calling are 300 baud only with 8 bit, no parity and 1 stop bit.

Jim Vestal
1100 E. 17th St. #41
Marysville, CA 95901

• I am running a CoCo BBS whose hours are 9 p.m. to 6 a.m. seven days a week. Baud rates are 300/1200, and the phone number is (718) 335-4874.

Bob Zuckerman
P.O. Box 368
Jackson Heights, NY 11372-0368

• My system has been online since November 1985. System protocol includes a baud rate of 300/1200/2400, 24 hours at 8-N-1; 65.5 Mb disk space. Phone (608) 655-3806 or (608) 274-6922.

The system operates on a Tandy 1000 and supports all Tandy operating systems, including the Color Computer.

The system also supports a very large Ham Conference and is open to the public.

Frankie Selje (SysOp)
P.O. Box 514
Minersville, PA 17355

• Announcing the birth of a new CoCo SIG on Sturbase BBS, featuring a CoCo conference, large upload/download base, online games and CoCo support! Call (806) 745-9167.

Lawrence Johnston
3510 27th St.
Lubbock, TX 79410

BULLETIN BOARD SYSTEMS

• You're standing at a guarded bridge. In the distance you see an open market and beyond that the walled city of Karian. As you stand there a guard steps up and says, "What is thy name?" That's how *The Realm Adventure* System opens up. *The Realm* is a true fantasy role-playing Adventure board using software written specifically for this type of board. You'd have to see it to appreciate the uniqueness of the system. All users are given instant access to all features. The hours are

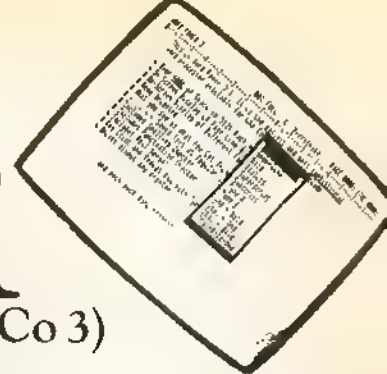
THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falstaff Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type RAI to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type LET to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.



Word Power 3.1

(The Ultimate Word Processor for the CoCo 3)



Power Unleashed! Unlike other word-processors, Word Power 3.1 is written from scratch for the CoCo3. It bridges the gap between "what is" and "what should be" in word-processors. No other word processor offers such a wide array of features that are so easy to learn and use.

DISPLAY

The 80-column display with true lowercase lets you view the full width of a standard page. All prompts are displayed in plain English in neat colored windows (see display above). The current column number, line number, page number and percentage of free memory is displayed on the screen at all times. The program even displays the bottom margin perforation so you know where one page ends and the other begins. You can also change foreground/background color of screen and select menu and carriage return colors to suit your needs! Carriage returns can be visible or invisible. Word Power 3.1 runs at double clock speed and can be used with RGB/composite/monochrome monitors as well as TV.

AVAILABLE MEMORY

No other word processor gives you so much memory. Word Power 3.1 gives you over 72K on a 128K machine and over 450K on a 512K machine to store text.

EDITING FEATURES

Word Power 3.1 has one of the most powerful and user-friendly full-screen editors with word-wrap. All you do is type. Word Power 3.1 takes care of the text arrangement. It even has a built-in Auto-Save feature which saves the current text to disk at regular intervals, so you know that your latest version is saved to disk. Here are some of the impressive editing features of Word Power 3.1:

Insert/Overstrike Mode (Cursor style changes to indicate mode); OOPS recall during delete; Type-ahead buffer for fast typers; Key-repeat (adjustable) and Key-click; Four-way cursor control and scrolling; Cursor to beginning of text, end of text, beginning of line, end of line, top/bottom of screen, next/previous word; Page up/down; Delete character, previous/next word, beginning/end of line, complete line, text before and after cursor; Locate/Replace with wild-card search with auto/manual replace; Block Mark, Unmark, Copy, Move and Delete; Line Positioning (Left/Center/Right); Set/Reset 120 programmable tab stops; Word count. Define left, right, top and bottom margins and page length. You can also highlight text (underline—with on-screen underlining, hold, italics, superscripts, etc). Word Power 3.1 even has a HELP screen which can be accessed any time during edit.

MAIL-MERGE

Ever try mailing out the same letter to 50 different people or sending out several resumes? Could be quite a chore. Not with Word Power 3.1. Using this feature, you can type a letter, follow it with a list of addresses and have Word Power 3.1 print out personalized letters. It's that easy!

SAVING/LOADING TEXT

Word Power 3.1 creates ASCII format files which are compatible with almost all terminal, spell-checking and other word-processing programs. It allows you to load, save, append and kill files and also to create and edit Basic, Pascal, C and Assembly files. You can select files by simply cursoring through the disk directory. Supports double-sided drives and various step rates.

PRINTING

Word Power 3.1 drives almost any printer (DMP series, EPSON, GEMINI, OKIDATA, etc). Allows print options such as baud rates, line spacing, page pause, partial print, page numbers, page number placement, linefeed option, multi-line headers/footers, right justification and number of copies (see display above). The values for these parameters and the margins can be changed anytime in the text by embedding Printer Option Codes. Word Power 3.1 has the **WHAT YOU SEE IS WHAT YOU GET** feature which allows you to preview the text on the screen as it will appear in print. You can see margins, page breaks, justification and more.

SPELLING CHECKER

Word Power 3.1 comes with a 50,000 word spelling checker/dictionary which finds and corrects mistakes within your text. You can add words to or delete from the dictionary or create a dictionary of your own.

PUNCTUATION CHECKER

This checker will proofread your text for punctuation errors such as capitalization, spaces after periods/commas, double words and much more. It's the perfect addition to any word processor.

DOCUMENTATION

Writing with Word Power 3.1 is a breeze. Word Power 3.1 comes with a well-written, easy-to-comprehend instruction manual which will lead you step-by-step through the program.

Word Power 3.1 comes on an UNPROTECTED disk and is compatible with RS DOS 1.0/1.1 and ADOS. Only \$79.95.

(Word Power 3 owners can get the 3.1 version by sending proof of purchase and \$10.00 to cover the cost of shipping and the manual.)

I purchased your Word Power. It arrived in time for my 13 year old daughter to process her history fair project. Word Power was easy to use and the features beat the heck out of the other word processors we were using.

KBG Tallahassee / Florida



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The Dream Machine

This is the 85th issue of THE RAINBOW. Seven years! What started out as a part-time venture has, as you all know, become a more-than-full-time business.

And, yes, as a business we have to do all the things that businesses do — prepare budgets, meet deadlines, set up policies and the like. But somehow, THE RAINBOW is different.

Someone once told me at a RAINBOWfest that it was a shame I could run a business and still enjoy playing with my CoCo. I guess he was right, and that is what makes this "different."

But there is something else, too. My mail will, I think, give you some insight to what I'm talking about.

* * *

The first letter comes from Massachusetts and contains a clipping of a newspaper article from *The Berkshire Eagle* of Pittsfield. It features a picture of Fred Scerbo and announces that Fred has been named a recipient of one of only seven statewide Distinguished Service Awards from the state's Interscholastic Athletic Association.

Fred, you see, is an assistant wrestling coach. That is a volunteer job at Drury High School, where Fred is a special needs teacher. As most of you know, he is one of our regular columnists and has been for years.

We've visited by phone many times. Often, he has mentioned that he's been working with this student or that on the CoCo, and how the computer provided an interest in something other than "trouble" for scores of youngsters in his area.

Indeed, it was the Color Computer that contributed to Fred's award. He set up a program to do the time-consuming job of setting pairings for wrestling tournaments. A number of associations in his area use those pairings.

COCO 3 UTILITIES GALORE

(All utilities support 40/80 columns for CoCo 3)
(CoCo 2 versions are available for most utilities)



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Now available for the CoCo III! You can design your own newspaper with Banner Headlines/6 articles using sophisticated Graphics, Fonts and Fill Patterns. Comes with 22 fonts & 50 pictures! Over 140K of code. Disk only \$49.95

MAILLIST PRO

The ultimate mailing list program. Allows you to add, edit, view, delete, change, sort (by zipcode or name) and print labels. It's indispensable! Disk Only \$19.95 (CoCo 2 version included)

DISK LABEL MAKER

Allows you to design professional disk labels! Allows elongated, normal and condensed format for text, double-strike, border creation and multiple-label printing. It's a MUST for any user with a disk drive. Disk Only \$19.95. Supports OMP 105/110/120/130/430, GEMINI, STAR, EPSON and compatibles. (CoCo 2 version included)

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An excellent utility to keep track of your bowling scores. Allows you to save scores under individuals or teams. You can edit, change, delete and compare scores. A must for anyone who wants to keep track of his or her bowling performance. Disk \$19.95 (CoCo 2 version included).

VCR TAPE ORGANIZER

Organize your videocassettes with this program! Allows you to index cassettes by title, rating, type, play time and comments. Also allows you to sort titles alphabetically and view/print selected tapes. If you own a VCR, this program is a must. Disk Only \$19.95 (CoCo 2 version included).

SCREEN DUMP

32, 40, 80 column text dump, PMODE 4 Graphics Dump. Single Keystroke Operation allows you to take snapshots of screens even when programs are running! Works on OMP's, Epson and Gemini. CoCo 1, 2 and 3. Disk Only \$24.95

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Please stop for a moment and think of the number of lives Fred Scerbo has touched through his work with his CoCo. Of course, there are so many of you who use his programs month in and month out from these pages. There are all those youngsters who found a computer was just as interesting as "trouble." And there are all those young people who have benefited through his coaching and his pairings program.

My other letter comes from someone who started into the CoCo business with a small advertisement in THE RAINBOW back in December and then repeated the ad in February of this year.

"Just when I thought I'd exhausted my buying audience I decided to give it one more shot and put an ad in the May issue," he wrote. "Now I'm so swamped with orders I don't have time to do any new 'recreational computing.' It's both a blessing and a curse."

The letter ends: "I guess what I'm getting at is this: I've been poor and unknown and I've been rich and famous (at least in CoCo circles). I prefer the latter. Thanks."

I am not going to identify this writer

— or the first one who tipped me off to Fred Scerbo's latest accomplishment — because the names are not necessary. Rather, I think I want to spend just a moment of your time before you wade into everything in this issue (or set out to construct the CoCo mobile, our Anniversary gift to you) to think about both these letters and what they mean.

To both Fred and our newly famous advertiser, the CoCo has become the dream about which stuff is made. Whether it is a way to help youngsters or to help make a profit, this wonderful little machine is, in reality, a great big dream machine.

Forget the letters. Think about yourself. I'll bet CoCo has opened doors for you, too. Isn't that marvelous? I think so.

Our cover this month is a takeoff on a well-known motion picture. Is that a Color Computer along with Dorothy and her friends on the Yellow Brick Road? They seem to be traveling somewhere over the Rainbow to the land where wishes and dreams come true.

We are all traveling that same road.

Thank you for letting us be with you for seven years now. And wish us at least seven more!

— Lonnie Falk

One-Liner Contest Winner . . .

This one-liner will turn your CoCo and printer into a typewriting team. A restriction: The text strings you give the program must be in chunks of 80 characters or less.

The listing:

```
100 CLS: CLEAR 1000: PRINT 0; 9, "MIN
I SCRIBIT": PRINT "WHAT WOULD YOU
LIKE TO BE PRINTED": INPUT A$: PRIN
T 0354+12, "PRINTING . . . . .": PRINT #
-2, A$: PRINT 0356+8, "<<<<PRINTED>>
>>": PRINT 0384+16, "AGAIN": PRINT 04
16+12, "(Y=YES/N=NO)": INPUT B$: IF B
$="Y" THEN CLS: IF B$="Y" THEN 100
```

Danny White
Chicago, IL

(For this winning one-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape*.)



LEONARDO'S PENCIL

For
Your
CoCo
1, 2, & 3

(Reviewed in Oct. 87 RAINBOW) Makes programming sensational-looking graphics as easy as moving a joystick! Converts precision drawings into "DRAW" commands which can be stand-alone BASIC programs or merged into other programs. Also includes "DEMO" and "PAINT" programs. Requires a spring-centered joystick or touch-pad. 32k ECB tape or disk \$14.95

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Mouse Tales



By Logan Ward

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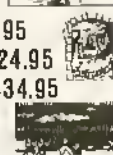
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How To Read Rainbow

When we use the term CoCo, we refer to an affectionate name that was first given to the Tandy Color Computer by its many fans, users and owners.

The BASIC program listings printed in THE RAINBOW are formatted for a 32-character screen — so they show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character "goes under" what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have "key boxes" to show you the *minimum* syntax a program needs. But, *do* read the text before you start typing.

Finally, the little disk and/or cassette symbols on the table of contents and at the beginning of articles indicate that the program is available through our RAINBOW ON DISK or RAINBOW ON TAPE service.

Using Machine Language

The easiest way to "put" a machine language program into memory is to use an editor/assembler, a program you can purchase from a number of sources. All you have to do, essentially, is copy the relevant instructions from THE RAINBOW's listing into CoCo.

Another method of putting an ML listing into CoCo is called "hand assembly" — assembly by hand, which *sometimes* causes problems with ORIGIN or EQUATE statements. You ought to know something about assembly to try this.

Use the following program if you want to hand-assemble ML listings:

```
10 CLEAR200, &H3F00: I=&H3F00
20 PRINT "ADDRESS: "; HEX$(I);
30 INPUT "BYTE": B$
40 POKE I, VAL("0"&H+B$)
50 I=I+1: GOTO 20
```

This program assumes you have a 16K CoCo. If you have 32K, change the &H3F00 in Line 10 to &H7F00 and change the value of I to &H7F00.

OS-9 and RAINBOW ON DISK

The OS-9 side of RAINBOW ON DISK contains two directories: CMDS and SOURCE. It also contains a file, read.me.first, which explains the division of the two directories. The CMDS directory contains executable programs and the SOURCE directory contains the ASCII source code for these programs. BASIC09 programs will only be altered in source form so they will only be found in the SOURCE directory.

OS-9 is a very powerful operating system. Because of this, it is not easy to learn at first. However, while we can give specific instructions for using the OS-9

programs, you will find that the OS-9 programs will be of little use unless you are familiar with the operating system. For this reason, if you haven't "learned" OS-9 or are not comfortable with it, we suggest you read *The Complete Rainbow Guide to OS-9* by Dale Puckett and Peter Dibble.

The following is not intended as a course in OS-9. It merely states how to get the OS-9 programs from RAINBOW ON DISK to your OS-9 system disk. Use the procedures appropriate for your system. Before doing so, however, boot the OS-9 operating system according to the documentation from Radio Shack.

- 1) Type `load dir list copy` and press ENTER.
- 2) If you have only one disk drive, remove the OS-9 system disk from Drive 0 and replace it with the OS-9 side of RAINBOW ON DISK. Then type `chd/d0` and press ENTER. If you have two disk drives, leave the system master in Drive 0 and put the RAINBOW ON DISK in Drive 1. Then type `chd/d1` and press ENTER.
- 3) List the read.me.first file to the screen by typing `list read.me.first` and pressing ENTER.
- 4) Entering `dir` will give you a directory of the OS-9 side of RAINBOW ON DISK. To see what programs are in the CMDS directory, enter `dir cmds`. Follow a similar method to see what source files are in the SOURCE directory.
- 5) When you find a program you want to use, copy it to the CMDS directory on your system disk with one of the following commands:

One-drive system: `copy /d0/cmds/ filename /d0/cmds/ filename -s`

The system will prompt you to alternately place the source disk (RAINBOW ON DISK) or the destination disk (system disk) in Drive 0.

Two-drive system: `copy /d1/cmds/ filename /d0/cmds/ filename`

Once you have copied the program, you execute it from your system master by placing that disk in Drive 0 and entering the name of the file.

The Rainbow Seal



The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product that carries the Seal has actually been seen by us, that it does, indeed, exist and that we have a sample copy here at THE RAINBOW.

Manufacturers of products — hardware, software and firmware — are encouraged by us to submit their products to THE RAINBOW for certification.

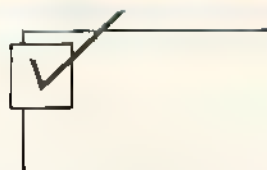
The Seal is not a "guarantee of satisfaction." The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

There is absolutely no relationship between advertising in THE RAINBOW and the certification process. Certification is open and available to any product per-

forming to CoCo. A Seal will be awarded to any commercial product, regardless of whether the firm advertises or not.

We will appreciate knowing of instances of violation of Seal use.

Rainbow Check Plus



The small box accompanying a program listing in THE RAINBOW is a "check sum" system, which is designed to help you type in programs accurately.

Rainbow Check PLUS counts the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use Rainbow Check PLUS, type in the program and save it for later use, then type in the command RUN and press ENTER. Once the program has run, type NEW and press ENTER to remove it from the area where the program you're typing in will go.

Now, while keying in a listing from THE RAINBOW, whenever you press the down arrow key, your CoCo gives the check sum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on Page 21 of the February 1984 RAINBOW.

Since Rainbow Check PLUS counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS: X=256*PEEK(35)+178
20 CLEAR 25, X-1
30 X=256*PEEK(35)+178
40 FOR Z=X TO X+77
50 READ Y: W=W+Y: PRINT Z, Y, W
60 POKE Z, Y: NEXT
70 IF W=7985 THEN B0 ELSE PRINT
  "DATA ERROR": STOP
80 EXEC X: END
90 DATA 182, 1, 106, 167, 140, 60, 134
100 DATA 126, 183, 1, 106, 190, 1, 107
110 DATA 175, 140, 50, 48, 140, 4, 191
120 DATA 1, 107, 57, 129, 10, 38, 38
130 DATA 52, 22, 79, 158, 25, 230, 129
140 DATA 39, 12, 171, 128, 171, 128
150 DATA 230, 132, 38, 250, 48, 1, 32
160 DATA 240, 183, 2, 222, 48, 140, 14
170 DATA 159, 166, 166, 132, 28, 254
180 DATA 189, 173, 198, 53, 22, 126, 0
190 DATA 0, 135, 255, 134, 40, 55
200 DATA 51, 52, 41, 0
```


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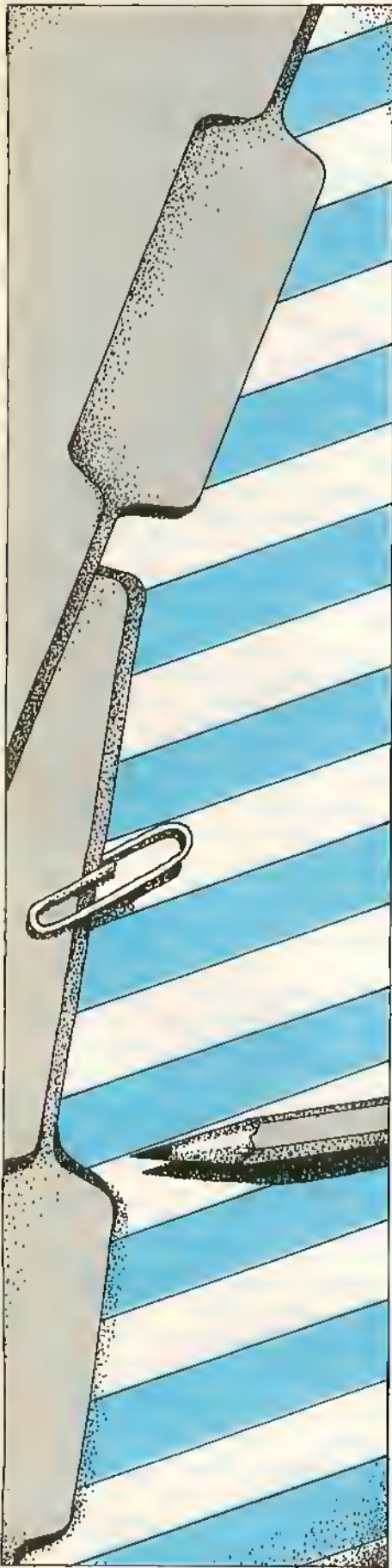
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Using subdirectories and shell scripts
to build an OS-9 menu system

A New Outlook for OS-9

By Mark Roseman

Microware's OS-9, like the Unix operating system on which it is based, is a very powerful and advanced system. It shares one other similarity with Unix — it can be extremely difficult to use.

While OS-9's commands are somewhat more readable than Unix's — `Dir` rather than `Ls`, or `List` rather than `Cat` — they are still cryptic enough to intimidate most users at first. And what was your own first reaction at seeing that OS9: prompt alone on the screen the first time you booted up?

This article presents a remarkably simple but effective solution to the problems of OS-9's user-unfriendliness by using user-configurable menus that give a clear indication of options available to the user, yet at the same time do not restrict the so-called "power user." The examples used here presuppose the use of a hard disk, as the system is most

effective with a hard disk. However, the identical concepts and techniques can be used on systems having only floppy disks.

Shell Programs

There are several programs on the market that are designed to make OS-9 easier to use. These work by creating a shell that replaces the OS-9 command line, allowing you to copy files, execute programs, etc., without using OS-9 directly. *The OS-9 Solution* by Computerware is an excellent example of such a "shell program."

The advantages of programs like this are fairly obvious. You can manipulate your files efficiently, and there is no worry about typing an incorrect command line or filename. Having a list of files available in your current directory makes life easier by allowing you to refer to files by a number or letter in the list, rather than by a (sometimes quite long!) filename.

However, these shell programs have their downside, too. Because they essentially hide the OS-9 command line from the user, they limit your options by being less flexible. These programs

Mark Roseman is currently studying computer science at the University of Manitoba and has been involved with computers for many years. He is a co-owner of and programmer for TRI-C Computing.

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Max-10 menus let you load files without typing anything: simply point and click.

SLEEK

A lot of word processors "do the job", but Max-10 makes word processing fun.

FILE COMPATIBILITY

Max-10 can import files from your outmoded word processor.

INTUITIVE

Max-10 is so well designed you can use it without reading the manual.

GRAPHICS

Mix text and graphics on your page. Pictures can be created by CoCo Max, the DS-69 Digitizer, or any graphics editor.

FUN

Max-10 is actually fun to use, which is quite an achievement for a word processor.

FIT IT IN

Pictures can be shrunk and stretched in both directions to fit the page and text.

FORMAT

Unlimited choice of right or left alignment, centering, and line spacing. Screen is updated immediately to show exact effects of changes.

TAB STOPS & MARGINS

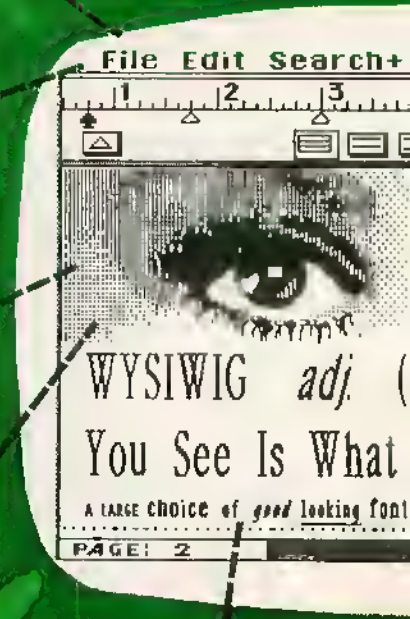
The rulers make tabs and margins easy to see, use, and change.

CUT AND PASTE

Move anything (even graphics) anywhere in the document.

PAGE NUMBERING

On-screen page number helps you find your place.



Max-10 Specifications: variable line length; right, left, top and bottom margins; word wrap; undo; page numbering; set starting page; left and right justification; centering; margins and centering can be changed anywhere in the document; variable line spacing; programmable headers and footers (with centering, graphics, etc.); type ahead; key repeat; key click; scroll up and down; jump to any point in document; ASCII file output for compatibility; disk directory; kill files; bold, italic, underline, superscript and subscript type styles; wordwrap; block cut, copy, move; global search and replace; paragraph indent; clipboard; merge; show file (on disk); free memory display; page count, paragraph count, word count; graphics can be resized and moved; multiple fonts; error recovery and more!

PRINTERS

Max-10 currently works with the following printers: DMP-105, DMP-106, DMP-130, Epson MX, RX, FX, LX and compatible, Gemini 10 series, CGP-220, and OKI-92.

BY DAVE STAMPE

Author of CoCo Max III, the best and most acclaimed CoCo 3 Graphics Editor.

GRAPHICS

Max-10 can import pictures stored in the following formats: CoCo Max I, II, III, MGE, MGF, 5 level DS-69, as well as any standard PMODE 4, HSCREEN 2 or 3 picture.

THE DAZZLING WORD PROCESSOR AND DOCUMENT CREATOR FOR THE COCO 3

PULL DOWN MENUS

All Max-10 Functions can be easily accessed through the six pull-down menus. There are no commands to learn.

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<input checked="" type="checkbox"/> Plain Text	CP
<input type="checkbox"/> Bold	CB
<input type="checkbox"/> Italics	CI
<input type="checkbox"/> Underlined	CU
<input type="checkbox"/> Superscript	CH
<input type="checkbox"/> Subscript	CL

z-ee-wig) 1. What
ou Get (acronym)

d styles

WYSIWYG!

What You See Is What You Get. Max-10 is the only CoCo word processor with graphics where the printout looks exactly like the screen (Macintosh style).

UNDO

The undo feature lets you change your mind even AFTER you make a drastic change, such as a "block delete".

SCROLL BOX

Point and click for lightning fast access to any point in the entire document.

MORE FONTS

Max-10 features 20 different fonts (styles and sizes). It goes well beyond your printer's built in character sets.

PAGE BREAK

Dotted lines on the screen show where pages begin and end. No more surprises at printing time.

FULL JUSTIFICATION

Proportionally spaced characters let you create text that looks really nice. No more squished "M"s and oversized "I"s.

TOTAL CONTROL

Any number of available character styles and sizes can be mixed on the same line.

HEADERS & FOOTERS

These are super easy to add and edit. They can even include graphics and pictures!

Why Max-10?

Most of you already have an "adequate" word processor, so why did we spend considerable time and effort to create Max-10?

Because you asked for it. CoCo Max made graphic creation fun. It is fast and feature loaded, yet amazingly easy to use. You wanted your word processor to be as friendly, forgiving, and amazing as CoCo Max. We couldn't do it on the CoCo 1 or 2, but with the advanced CoCo 3 graphics, the word processor you always wanted is here: Max-10.

Max-10 is not just a word processor. It gives you letter styles and sizes that your printer doesn't have. It lets you mix graphics and pictures in your text for a professional looking output.

Additionally, the screen shows exactly what your output will look like. Text is in the size and style that it will print. Page breaks, line length and spacing are clearly shown. No more hoping that the text will fit, no more guessing at type styles, no more messing with printer codes, no more cryptic commands to memorize, and best of all, the undo feature lets you make a mistake and still recover your text.

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Any CoCo 3 (128K or 512K) with at least 1 Disk Drive.
Mouse or joystick.
Monochrome, RGB or Composite monitor.

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usually contain an option to escape to the OS-9 command line, but again, this only hampers the user.

One other note about these programs: While they do allow you to execute a program by "pointing" to it, they don't actually tell you anything about the program other than the filename. Wouldn't it be nice, especially for new users, if they could tell at a glance what a program actually did?

The menu system described in this article has the advantages of being extremely efficient, user-friendly and easy to implement, yet does not give up any of the power of having the command line available at all times. When the system first boots up, a menu that looks like Figure 1 appears on the screen. A list of the available applications is spelled out for the user, and a short abbreviation is given. Typing the abbreviation will execute the given program, or perhaps display a comparable menu, showing other options (Figure 2). At the same time all these descriptive menus are being displayed, you can type any OS-9 command you'd like.

```

*****
*           Welcome to           *
*   <<< THE MACHINE >>>         *
*                               *
*           MAIN MENU            *
*                               *
* WP .. Scribble WordPro        *
* SS .. FabCalc Spreadsheet     *
* PT .. Phone Terminal          *
* PH .. Programming Menu        *
* DU .. Disk Utilities           *
* Enter option or OS9 cmdnd     *
*****

```

Figure 1: The main Menu.dat file

```

*****
*   <<< THE MACHINE >>>         *
*                               *
*           PROGRAMMING MENU     *
*                               *
* CC .. C Compiler               *
* BAS .. Basic09                 *
* PAS .. Pascal                  *
* MM .. Back to Main Menu        *
* Enter option or OS9 cmdnd     *
*****

```

Figure 2: The Menu.dat file for the PROGRAMMING subdirectory

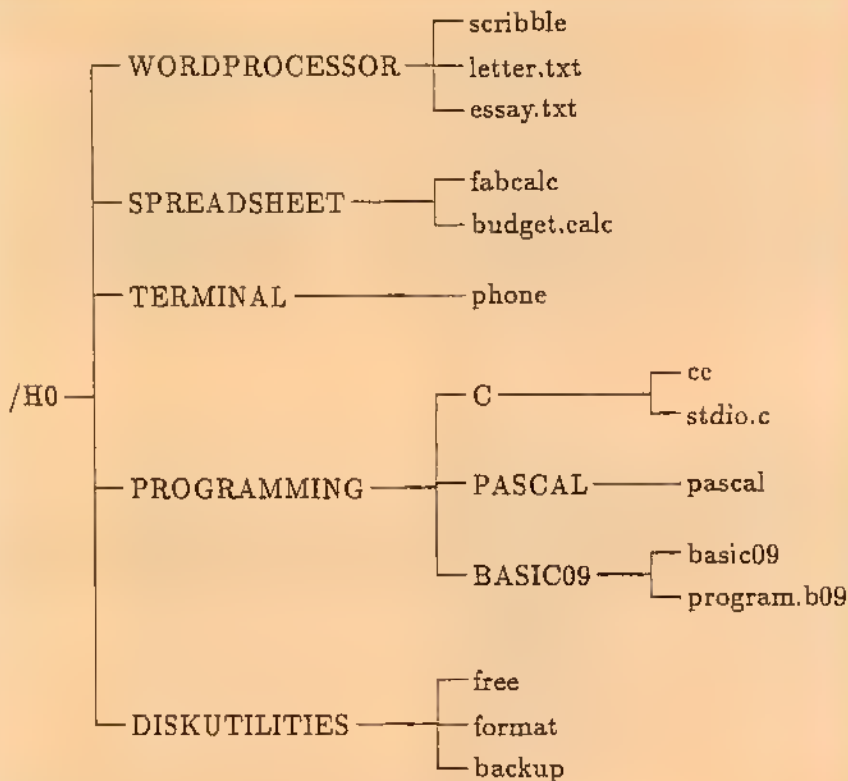


Figure 3: A typical disk organization

How it Works

This system is not terribly complicated or difficult to understand, but it does require a solid understanding of two fundamental concepts in OS-9: the hierarchical directory structure and OS-9 shell scripts. The hierarchical directory structure — in other words, the use of subdirectories — is a subject that is explained fairly well in the OS-9 manuals. There have also been several articles in previous RAINBOWs that have done an excellent job of explaining this concept. Shell scripts are also explained in the manuals. Briefly, they are text files containing a series of OS-9 commands. When one of these scripts is executed (by typing its filename), the commands in the file are executed by OS-9 just as if you had typed them in one at a time by hand. These shell scripts can be created using Build, Edit or any other text editor.

The menuing system first requires your disk drive be set up in an organized and logical manner (see Figure 3 as an example). Each application program you have should be placed in its own subdirectory, and all the files associated

with that application should be in that same subdirectory. Give the subdirectories logical names, such as WORDPROCESSOR, SPREADSHEET, etc. If you happen to have a number of similar types of programs, you might group them together. For example, you might have a subdirectory PROGRAMMING, and inside that subdirectory have other subdirectories called C, PASCAL and BASIC09.

You'll have to create two things in your main directory, as well as in any subdirectories containing *other* subdirectories (such as the PROGRAMMING subdirectory mentioned above). These two things are a help menu and a set of script files.

What About Those Menus?

You've seen examples of these menus already. Figure 1 is an example of a typical menu found in the root (start-up) directory, while Figure 2 illustrates a possible menu found in our PROGRAMMING subdirectory.

There is nothing very special about the format of these menus. They are just regular text files and can contain any-

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I never expected to see anything like it on my CoCo screen. There isn't a single command to remember. Even a person who has no drawing ability like myself can create a presentable picture. I've spent hours just doodling enjoying all the things from silly to the serious. Fascinating experience. Buy it, you won't be sorry.
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- CoCo Max III is not an upgrade of CoCo Max II. It is entirely rewritten to take advantage of the new CoCo 3 hardware (More memory, resolution, colors, speed,...)
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- The CoCo Max III disk is not copy protected.
- CoCo Max III only works with the CoCo 3.
- A Y-Cable or Multi-pak is not necessary.
- Colors are printed in five shades of gray.
- CoCo Max III can read CoCo Max II pictures.

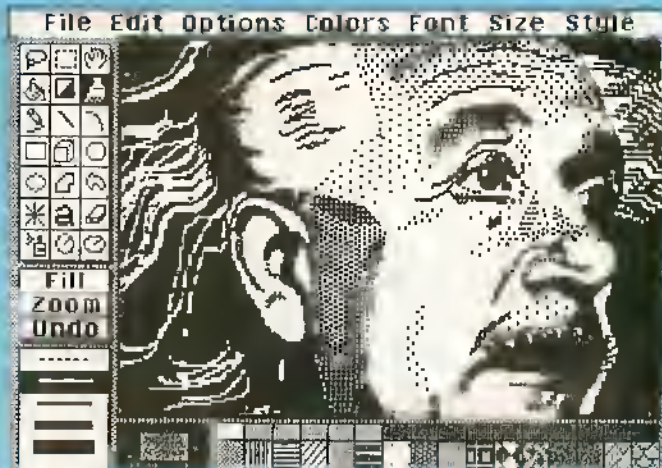
Note: CoCo Max II (for the CoCo 2) is still available on disk (\$79.95). CoCo Max I is still available on tape (\$69.95). For details, refer to our double page ad in any *Rainbow* from January '86 to July '87

Toll Free operators are for orders only. If you need precise answers, call the tech line. (Detailed CoCo Max specs are included with the Demo Disk.)

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thing you'd like. You can create them using Build, Edit or any other editor. What they *should* contain, however, is a list of the different applications (word processor, etc.) available and the abbreviations used to access them. These abbreviations can be anything you'd like; however, they should not be the names of other OS-9 commands, except under special circumstances where you actually want that command executed (as would be the case in a DISKUTILITIES subdirectory containing the Free or Format commands). Aside from that, put anything you like in the menu files — borders, titles, or anything else. You can personalize these as much as you want.

These menu files have one restriction: They have to be named Menu.dat, so that the system will be able to recognize them as menus. (You will have several files on your disk drive called Menu.dat, but each will be in a different subdirectory.)

"You can manipulate your files efficiently, and there is no worry about typing an incorrect command line or filename."

Creating Your Own Commands

What we now want to do is use shell scripts to create some new commands of our own. The first one will be a command to print the menu for whatever subdirectory in which you happen to be located at the moment. Because we want this command (which will logically enough be called Menu) to work no matter what subdirectory we are in, we'll create it in the standard "current execution directory," /H0/CMD5 if you are using a hard disk, or /C0/CMD5 for a floppy system. (If you're not sure why the file must be in this special directory, refer to the OS-9 manuals.)

The Menu command is fairly short, containing only two commands, CIs and List Menu.dat. To create this file using Build, type build /h0/cmds/menu, followed by the two commands

above, and then enter a blank line to end. Now, whenever you type menu, you'll get a list of the menu file in the directory you're currently in. If you happen to do this in a subdirectory without a Menu.dat file, you'll get an error telling you that the file was not found. However, as you'll see, you won't normally encounter this.

Remember that we wanted such a menu displayed when the system was first booted up? This can be easily done at this point. In the root directory there is a special shell script named Start-up that is executed when you first boot OS-9. It normally will do things like set the system clock, but you can add (again, with an editor) at the end a line containing only the command Menu. You'll then get the menu displayed each time you boot up.

Executing Your Applications

Only one piece of this whole system is left to be discussed: How do we get those application programs started by just typing the abbreviations we've decided to use for them? It should come as no surprise that more shell scripts are used. In particular, we have to create one shell script per application. The filename of the script must be the same as the abbreviation used in the menu, and the script must be in the same directory as the Menu.dat file describing it.

What should these shell scripts do? Well, exactly what you would do yourself to execute the application! First, you'd have to change directories so that you are in the same directory as the application. You'd then execute the program by typing its filename. When it was done, you'd change back to your previous directory, and then redisplay the menu.

Figure 4 is an example of such a script, used to call a word processing program called Scribble, which is in the subdirectory WORDPROCESSOR. The script would be called wp, in accordance with the menu in Figure 1. Note the use of Cld . . to return to the previous directory.

Recall the earlier example of the PROGRAMMING subdirectory. In this case, we want the shell script on the main menu to merely go to the new directory and display that menu. This is accomplished with a script containing the two lines Cld Programming and Menu. You also want an option on the PROGRAMMING menu that returns to the main menu. This script contains the two lines Cld . . and Menu.

```
* Here is an example shell
* script which will execute
* a program called 'scribble'
* in the 'wordprocessing'
* directory.
*
* Note that the lines which
* start with a '*' are just
* comments which can be left
* out.
*
* If a program requires any
* parameters, they should be
* included in the second line
* below. For instance, you
* might need to change the
* line to 'scribble -c' if
* the program required this.
*
chd wordprocessing
scribble
chd . .
menu
```

Figure 4: The wp shell script

You've now seen the complete system. No "sneaky tricks" were used — everything was implemented using the standard ideas of subdirectories and shell scripts. Again, note that even with all the menus and abbreviations available, you were still always using the OS-9 command line.

When you install new programs on your system, you will need to do two things — add to one of your Menu.dat files a line describing the new program, and create a new script file to call your program.

It should be apparent why a hard disk would be more appropriate than floppy disks for a system such as this one. Generally, all the applications would reside on a single disk. A hard disk, having much more space, would be able to hold many more applications.

This system can actually be implemented on any machine using an operating system that supports subdirectories and shell scripts (often called "batch files"). Wouldn't you love to tell your boss that the menning system you've installed on the company's IBM PS/2 Model 80 is an adaptation of something on your "wimpy CoCo" he keeps laughing at?

(Questions and comments concerning this tutorial may be directed to the author at 736 Queenston St., Winnipeg, Man., Canada R3N 0X7. Please enclose an SASE when requesting a reply.) ☺

VIP Writer III

VIP Writer has ALWAYS led the pack with features and now VIP Writer III still leads the way! The chart below illustrates this fact. Telewriter 128 only gives you 48K for text. Why is it called Telewriter 128? Word power 3 gives only 72K! VIP Writer III makes use of over 106K! VIP Writer III is the ONLY CoCo 3 word processor worthy of its name!

WORD PROCESSOR COMPARISON CHART			
CoCo3 with 128K	VIP Writer III	Telewriter 128	Word Power 3
Text Storage	OVER 49,000	48,000	72,000
Print Spooler	YES 57,000	NONE	NONE
Total Storage	106,000	48,000	72,000
Spelling Checker	VIP Speller	NONE	FREEWARE
RGB HD Support	100%	NONE	NONE
Screen Display	32/40/64/80	40/80	80

SCREEN DISPLAY OPTIONS

As the chart above shows, VIP Writer III offers more screen width options, all with 24 lines and actual lower case letters. It uses the CoCo 3's hardware display and double clock speed and is VERY VERY FAST! You can choose fore and background colors from up to 64 different hues. Color can be turned ON or OFF for the best possible display using a color or monochrome monitor or TV set. VIP Writer III has a built in on-line context sensitive help facility which displays command usage in easy to read colored windows.

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VIP Writer III comes with a configuration / printer installation program which lets you customize VIP Writer III to suit your own liking. You can set screen width and colors as well as margins and more. You can also install your own printer and set interface type (serial, parallel or J&M), baud rate, line feeds, etc. Once done, you never have to enter these parameters again! VIP Writer III will load n' go with your custom configuration every time!

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VIP Writer III creates ASCII text files which are compatible with all other VIP Programs as well as other programs which use ASCII file format. You can use VIP Writer III to even create BASIC programs! There is a 49K text buffer and disk or cassette file linking allowing virtually unlimited text space. VIP Writer III works with up to four disk drives and lets you display disk directories and free space as well as rename or kill disk files. In addition VIP Writer III is 100% compatible with the RGB Computer Systems HARD DISK.

EDITING FEATURES

VIP Writer III has a full featured screen editor which can be used to edit text with lines up to 240 characters long with or without automatic word wrap around. You can select type-over mode or insert mode. There is even an OOPS command to recall a cleared text buffer. Other editing features include: Type-ahead, typematic key repeat and key beep for flawless text entry, end of line bell, full four way cursor control with scrolling, top of textfile, bottom of textfile, page up, page down, top of screen, bottom of screen, beginning of line, end of line, left one word, right one word, DELETE character, to beginning or end of line, word to the left or right, or entire line, INSERT character or line, LOCATE and/or CHANGE or DELETE single or multiple occurrence using wildcards, BLOCK copy, move or delete with up to TEN simultaneous block manipulations, TAB key and programmable tab stops, word count, line restore, three PROGRAMMABLE FUNCTIONS to perform tasks such as auto column creation and multiple copy printing.

TEXT FORMATTING

VIP Writer III automatically formats your text for you or allows you to format your text in any way you wish. You can change the top, bottom, left or right margin and page length. You can set your text flush left, center or flush right. You can turn right hand justification on or off. You can have headers, footers, page numbers and TWO auxiliary lines which can appear on odd, even or all pages. You can also select the line on which they appear! You can even change the line spacing! Parameters can be altered ANYWHERE!

PREVIEW PRINT WINDOW

VIP Writer III features an exclusive format window which allows you to preview your document BEFORE PRINTING IT! You are able to move up, down, left and right to see centered text, margins, page breaks, orphan lines etc. This makes hyphenation a snap!

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VIP Writer III prints TWICE as fast as any other CoCo word processor! It supports most serial or parallel printers using J&M JFD-CP or Rainbow interface and gives you the ability to select baud rates from 110 to 19,200. You can embed printer control codes anywhere in your text file EVEN WITHIN JUSTIFIED TEXT! VIP Writer III also has TWENTY programmable printer macros which allow you to easily control all of your printers capabilities such as bold, underline, italics and superscript using simple key strokes. Other features include: multiple copy printing, single sheet pause, line feeds.

PRINT SPOOLING

Save up to \$150 on a print spooler because VIP Writer III has a built in print spooler with a 57,000 character buffer which allows you to print one document WHILE you are editing another. You don't have to wait until your printer is done before starting another job!

DOCUMENTATION

VIP Writer III is supplied with a 125 page instruction manual which is well written and includes many examples. The manual has a tutorial and glossary of terms for the beginner as well as a complete index! VIP Writer III includes VIP Speller. DISK \$79.95
Cassette version does not include VIP Speller. TAPE \$59.95

VIP Writer owners: Upgrade to the VIP Writer III Disk for \$49.95 or Tape for \$39.95. Send original disk or tape. Include \$3 S/H.

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For a limited time you can trade in your old software for the VIP Writer I or III and save up to \$20! Send in your old disk or tape and manual. VIP Writer tape \$34.95, disk \$49.95, VIP Writer III tape \$44.95, disk \$59.95, include \$3.00 shipping. Offer expires 8/31/88

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The VIP Database III features selectable screen displays of 40, 64 or 80 characters by 24 lines with choice of 64 foreground and background colors for maximum utility. It uses the CoCo 3's hardware screen and double clock speed to be the FASTEST database available! VIP Database III will handle as many records as will fit on your disks and is structured in a simple and easy to understand menu system with full prompting for easy operation. Your data is stored in records of your own design. All files are fully indexed for speed and efficiency. Full sort of records is provided for easy listing of names, figures, addresses, etc., in ascending or descending alphabetical or numeric order. Records can be searched for specific entries using multiple search criteria. With Database III mail-merge you may also combine files, sort and print mailing lists, print form letters, address envelopes - the list is endless. The built-in MATH package even performs arithmetic operations and updates other fields. VIP Database III also has a print spooler and report generator with unlimited print format capabilities including embeddable control codes for use with ALL printers. DISK \$69.95

VIP Database owners: Upgrade to the VIP Database III Disk for \$39.95. Send original disk. Include \$3 shipping.

VIP Integrated Library

The VIP Integrated Library combines all six popular VIP application programs - VIP Writer, Speller, Calc, Database, Terminal and Disk-ZAP - into one program on one disk! The program is called VIP Desktop. From the desktop you have instant access to word processing with a spelling checker always in attendance, data management with mail merge, spreadsheet financial analysis, telecommunications and disk maintenance. 64K required. Include \$4.00 shipping for this product. DISK \$149.95
CoCo 3 owners: Purchase the VIP Integrated Library /WDE (Writer & Database Enhanced) which has the VIP Writer III and VIP Database III in place of the VIP Writer and VIP Database. Include \$4.00 shipping for this product. DISK \$169.95

Previous VIP Library owners: Call or write for upgrade pricing.

VIP Writer

VIP Writer is also available for CoCo 1 and 2 owners and has all the features found in the VIP Writer III including VIP Speller except for the following: The screen display is 32, 51, 64 or 85 columns by 21 or 24 rows. Screen colors are green, black or white. Help is not presented in colored windows. Double clock speed is not supported. Parallel printer interface is not supported. Print spooler is not available. Hard disk is not supported. Even so, VIP Writer still out-features the rest! It's a CoCo 1 or 2 owners best choice in word processors. Includes VIP Speller. DISK \$69.95
Cassette version does not include VIP Speller. TAPE \$49.95

VIP Speller

VIP Speller works with ANY ASCII file created by most popular word processors. It automatically checks text files for words to be corrected, marked for special attention or even added to the dictionary. You can even view the misspelled word in context! VIP Speller comes with a specially edited 50,000 word dictionary, and words can be added to or deleted from the dictionary or you can create your own. DISK \$34.95

VIP Database

VIP Database has all the features of VIP Database III except the screen widths are 51, 64 and 85. Screen colors are green, black and white, double speed is not supported, spooler is not available. Still VIP Database is the best database for the CoCo 1 & 2! DISK \$49.95

VIP Calc

Now every CoCo owner has access to a calculating and planning tool better than VisiCalc™, containing all its features and commands and then some. VIP Calc displays 32, 51, 64 or 85 characters by 21 or 24 lines right on the screen. VIP Calc allows up to a 33K worksheet with up to 512 columns by 1024 rows! In addition, VIP Calc has multiple windows which allow you to compare and contrast results of changes. Other features include 16 DIGIT PRECISION, trig. functions, averaging, algebraic functions, column and row ascending and descending SORTS, locate formulas or titles in cells, block move and replicate, global or local column width, limitless programmable functions, works with ANY printer. Embed printer control codes for customized printing. Combine spreadsheet data with VIP Writer documents to create ledgers, projections, statistical and financial budgets and reports. Requires 64K. DISK \$59.95

VIP Terminal

For your important communications needs you've got to go beyond software that only lets you chat. You need a smart terminal so that you can send and receive programs and messages and print them! The VIP Terminal features 32, 51, 64 or 85 characters by 21 or 24 lines on the screen and has a 43K byte buffer to store information. DISK \$39.95

VIP Disk-ZAP

VIP Disk-ZAP is the ultimate disk repair utility for simple and quick repair of most disk errors. Designed with the non-programmer in mind, the VIP Disk-ZAP will let you retrieve all types of bashed files, BASIC and Machine Language programs. It even works with 40 track drives! The 50 page tutorial makes the novice an expert. DISK \$24.95

All disk products are unprotected and run under RSDOS.

SD ENTERPRISES

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Please add \$3 for shipping and handling. Outside continental US add \$4 S/H. COD orders add an additional \$2.25. Checks allow 3 weeks for delivery. All other orders are shipped the same day.
Telewriter 128 is a trademark of Cognitic. Word Power 3 is a trademark of Microcom Software.

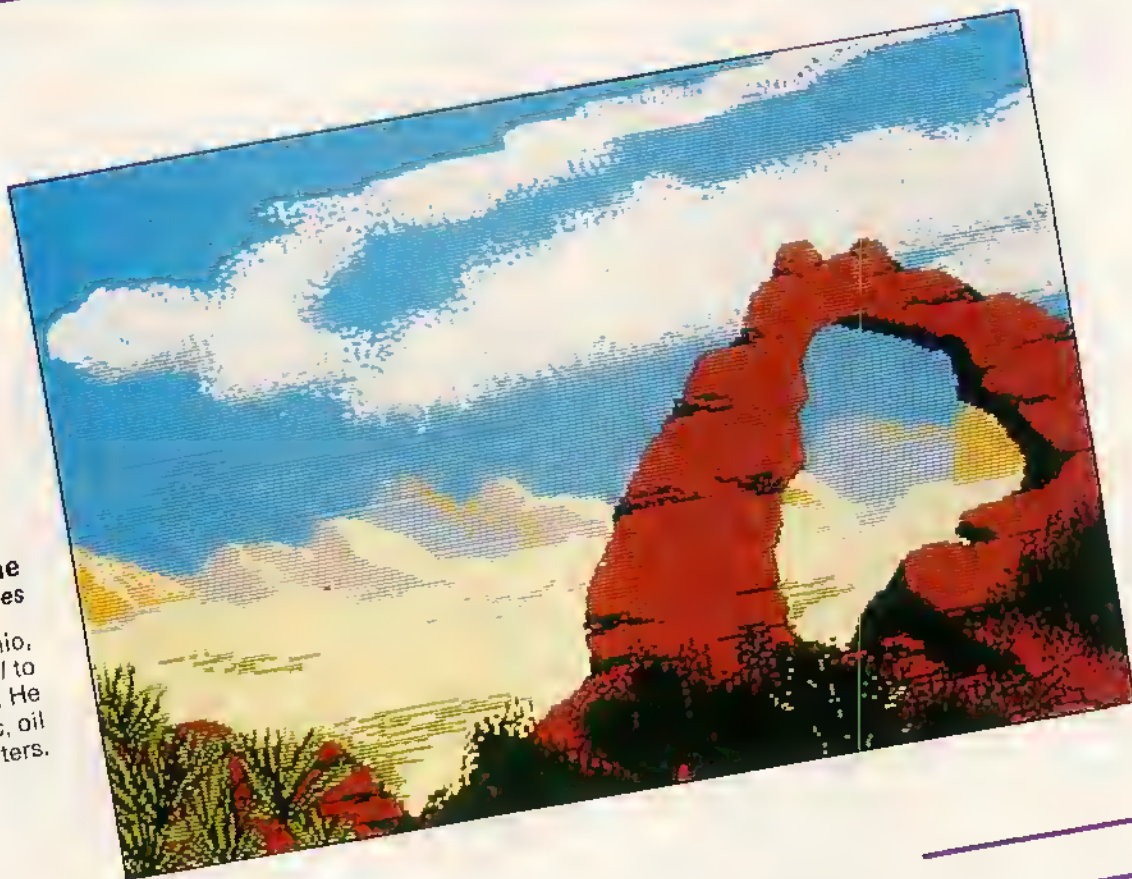
The CoCo Gallery

1st

COCO 3

Sandstone
Wally Mayes

Wally, of Hamilton, Ohio, used CoCo Max III to design this graphic. He enjoys country music, oil painting and computers.



2nd

Setup
Pete Hagemeyer

Pete used CoCo Max III to display his computer setup. He lives in Bethlehem, Pennsylvania, and enjoys model railroading, drawing and working with the CoCo.

SHOWCASE YOUR BEST! You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community! Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also, please include a few facts about yourself.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is not an original work.

We will award two first prizes of \$25, one for the CoCo 3 and one for the CoCo 1 and 2; one second prize of \$15 and one third prize of \$10. Honorable Mentions may also be given.

Please send your entry on either tape or disk to the CoCo Gallery, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. Remember, this is a contest and your entry will not be returned.

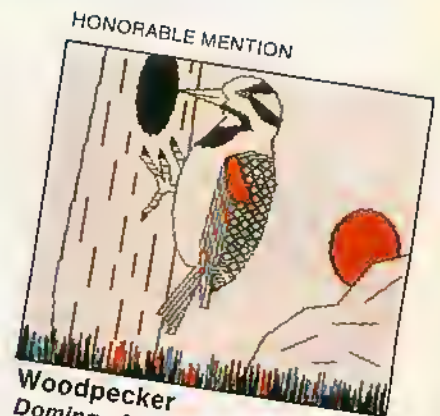
— Angela Kapfhammer, Curator



3rd

King Tut
Jerry Suchman

CoCo Max III was used to create this scene of this ancient time. Jerry is an accountant, lives in Manchester, Missouri, and uses the CoCo as a form of relaxation.



Woodpecker
Domingo Martinez

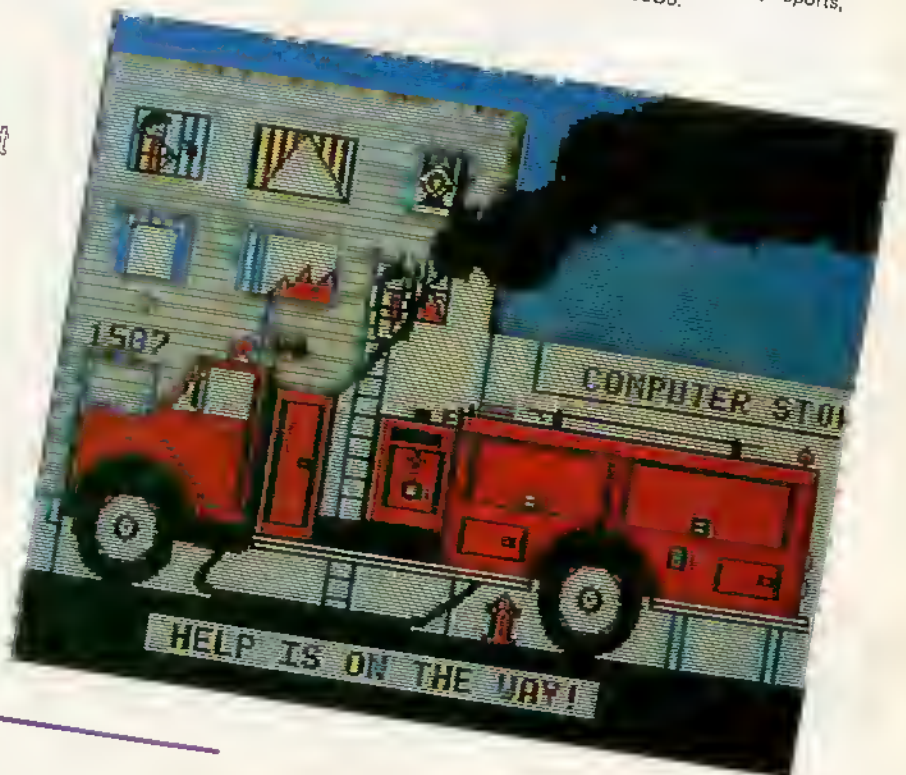
Domingo, of Miami, Florida, used BASIC and the CoCo 2 to develop this view of the tree-climbing bird. He enjoys sports, movies and his CoCo.

1st

COCO 1 & 2

Help is on the way
Carl Johnson

CoCoDraw was used to develop this scene of rescue. Carl is a firefighter in Sioux Falls and lives in Brandon, South Dakota.





A logic problem tester

One of Our Pool Balls Must Be Crazy!

By Bruce W. Ronald

You're a pool ball salesman, and your best customer is irate. The last set of 12 balls you sold him has one defective ball. He tells you to find out which of the balls, numbered 1 through 12, is the culprit — and if it is heavier or lighter than the others.

He tells you that you have three weighings only, on a simple balance scale. Your job is to figure out a weighing technique capable of finding the rogue ball every time — the algorithm, in computer talk. It must work in every case, no matter which ball is the deviant, and it must tell if the deviant is either heavy or light.

One final point. A simple balance scale doesn't weigh anything. It can only show you if one side is heavier (or lighter) than the other. If the left-hand side drops, it is either because there's a heavy ball on the left side or a light ball on the right.

Bruce Ronald, an advertising copywriter, holds a bachelor's degree in speech. He has written a science fiction thriller, Our Man in Space, and the book of the musical Dracula, Baby. He and his wife, Virginia, coauthored two prize-winning local histories of Dayton and its suburb, Oakwood — the latter on the CoCo.

It took me hours to find the trick (and if you figure it out in 15 minutes, I don't want to know). I have prepared a program that will select a deviant ball for you, determine if it is light or heavy, and conduct any three weighings (such as 1, 2 and 3 versus 4, 5 and 6) you choose.



There are two versions of the program — one for the CoCo 3 and one for the CoCos 1 and 2. CoCo 3 owners should type in Listing 1; CoCo 1 and 2 owners should type in Listing 2. The CoCo 3 version uses the computer's ability to handle 16 colors at once to more or less match the yellow, blue, red, purple, green, orange, maroon, black pool ball sequence. The CoCo 1 and 2 version uses red and blue on a PMODE3 screen.

Telewriter-128™

the Color Computer 3 Word Processor

For over 5 years now, Telewriter has been the #1 Color Computer word processor, both in popularity and in performance. Telewriter's near perfect mix of sophisticated professional features and a very natural user interface, has earned it the highest praise in numerous magazines, and an intensely loyal following among tens of thousands of Color Computer users all over the world.

HISTORY

Throughout the history of the Color Computer, Telewriter has pioneered software breakthroughs that set the standards.

In 1981, it was Telewriter 1.0 that first took the Color Computer's inadequate 32X16 all-uppercase display, and replaced it with a graphics-based 51X24 upper and lowercase display.

A few years later, Telewriter-64 added high density 64X24 and 85X24 displays and access to the full 64K of the newer Color Computers.

THE NEW AGE

Today, Telewriter-64 is recognized as the standard Color Computer word processor. It runs on all Tandy Color Computers — from the original Color Computer 1, to the Color Computer 2, and 3.

But the Color Computer 3 brings a whole new level of power to low cost computing and, so, a new Telewriter is here to put that power to work for you. We call it Telewriter-128.

TELEWRITER-128

You don't mess with a good thing, so Telewriter-128 is still Telewriter-64 at heart. The commands, and the user interface are essentially the same. If you know Telewriter-64, then you already know Telewriter-128. And, if you don't know Telewriter-64, you'll still have an easy time learning and using Telewriter-128.

80 COLUMNS

But there are major differences as well. First, Telewriter-128 uses the Color Computer 3's new 80 column screen display.

This means, simply, that using Telewriter-128 on a low cost Color Computer 3 will look a lot like using a more expensive word processor on a much more expensive IBM PC, PS/2, or clone.

SPEED

Second, Telewriter-128 is lightning fast. Telewriter-64 was fast in its own right, but, by accessing the Color Computer 3's video hardware directly, and by running the machine in double speed mode, Telewriter-128 is able to provide extremely fast scrolling and instant paging — functions whose speed is crucial to serious word processing.

In this department, Telewriter-128 doesn't simply keep up with IBM-based word processors — it generally surpasses them!

EASE

Third, Telewriter-128 adds a host of new features big and small, that make it even easier to use.

Features like: Quick function key access to the editor or the menus — an instant on-line help screen summarizing all Telewriter commands and special characters — an option file where you store your personal set of format and screen settings so you only have to set them once!

Then, there's a quick save feature which allows you to save all your current work without leaving the editor. There's a simple way to cursor through the disk directory and read in a file by just hitting ENTER. And there's more.

NEW POWER

Telewriter-64 always had the power to handle any kind of serious writing, from letters to textbooks. But, here too, Telewriter-128 adds major features.

Like Macros — which let you insert whole words or phrases (even sets of control codes or format commands) into your text, with a single keypress. And every time you power up Telewriter-128, the macro definitions are automatically loaded*, so they're always there.

Then there's a Print Preview feature that shows you, on-screen, the way your printed text will look — with margins, headers, centering, justification, page numbering, and page breaks. This guarantees letter perfect documents every time, and makes tasks like widow/orphan line elimination, a breeze.

TELEWRITER-64 OR TELEWRITER-128

We could go on listing features, but the point is this: If you own a Color Computer, you already have the hardware for the most powerful, low cost word processor in town. All you need now is to add the heart and soul:

Telewriter-64, for the Color Computer 1 and 2, costs \$59.95 on disk, \$49.95 on cassette.

Telewriter-128 for the Color Computer 3 costs \$79.95 on disk, \$69.95 on cassette.

To order by Mastercard or Visa call (619) 755-1258 anytime, or send check or money order plus \$2 shipping (Californians add 6% sales tax) to:

COGNITEC

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To upgrade from Telewriter-64 to Telewriter-128, return your original disk or cassette with \$39.95. (Add \$10 if you're also upgrading from cassette to disk. Deduct \$10 with proof of Oct '87 - Feb '88, purchase of Telewriter-64.)

When I first got Telewriter-64 last year, I was in heaven. I couldn't believe the program's versatility and ease of use.

-The RAINBOW, Oct. 1985

TELEWRITER-64 FEATURES: Compatibility with any printer that works with the Color Computer; embedded control codes for underlining, boldface, sub/superscript, variable fonts; format commands for headers, centering, margin and spacing changes anywhere in the document; Format menu to set margins, spacing, page numbering, BAI/D rate, lines per page, justification; Chain printing for one shot printing of multi-file documents. Fast, full-screen editor with wordwrap, block copy/move/delete, global search and replace, wild card search, fast 4-way auto-repeat cursor, fast scrolling, forward and backward paging, text alignment, tabs, error protection, word and line counter. Insert or delete text anywhere on the screen. Simple, easy to remember commands. Optional ASCII files for compatibility with spell checkers, terminal programs,

and BASIC. Load, save, append, partial save files to disk or cassette. Kill, rename and list disk files. Cassette verify and auto-retry on error.

TELEWRITER-128 - ADDITIONAL FEATURES Print preview from editor; multiple copy print; footers; hanging indents; cursor thru disk directory to load, append, rename and kill files; quick file save from editor; keyclick; key repeat; true block move; 24, 25, or 28 line screen; 40 or 80 column screen; dual speed cursor; on-line help; overstrike mode; word delete; wordwrap at margin; user definable macros; nested macros; instant status window for information on cursor position, word count, etc.; instant function key access to menus or editor; options menu for setting character and screen colors, key repeat and delay rates, definable foreign symbols.



The only tricky part of the program is the array-in/array-out routine that allows input on a text screen and output for the graphics screen. The CoCo 3 version is written for an RGB monitor,

and you may have to adjust the colors for a TV set or a composite monitor. Next month I'll give you the solution, if you haven't mastered the problem by then.

(Questions or comments regarding this program may be directed to the author at 101 Forrer Blvd., Dayton, OH 45419. Please enclose an SASE when requesting a reply.)

✓	170 .....125	780 .....119
	350 .....72	960 .....23
	570 .....51	END .....83

Listing 1: BALL3

```

5 REM BALL3 BY BRUCE W. RONALD
10 DIM LH(6):DIM RH(6)
20 DATA 0,0,0,0,0,0,0,0,0,0,0,0
30 HBUFF 1,3618:HBUFF 2,3618
40 X=RND(-TIMER)
50 X=RND(12):Y=RND(1000)
60 IF Y>=500 THEN Y1=1
70 IF Y1=1 THEN Y$="HEAVY"
80 IF Y<500 THEN Y1=-1
90 IF Y1=-1 THEN Y$="LIGHT"
100 PALETTE RGB:WIDTH 40:CLS3:AT
TR3,2:REM CHANGE THIS FOR COMPOS
ITE MONITOR
105 PALETTE6,40:PALETTE7,38:PALE
TTE5,45
110 PRINT:PRINT:PRINT.
120 PRINT"    The Case of the Dev
iant Pool Ball"
130 PRINT:PRINT:PRINT:PRINT:PRIN
T"One ball is either":ATTR3,2,B
:PRINT" HEAVIER";
140 ATTR3,2:PRINT " or";:ATTR3,2
,B:PRINT" LIGHTER"
150 PRINT:PRINT:PRINT
160 ATTR3,2:PRINT:PRINT"YOU HAVE
 3 WEIGHINGS TO DETERMINE WHICH
";
163 PRINT"BALL AND IF IT IS HEAV
IER OR";
165 PRINT" LIGHTER    THAN THE O
THERS"
170 FOR T=1 TO 1000:NEXT T
180 LOCATE26,20:PRINT"HERE WE GO
"
190 FOR T=1 TO 800:NEXT T
200 CLS:FOR C=1 TO 4
210 WIDTH40:CLS3:ATTR3,2
220 IF C=1 THEN A$="          WE
IGHING ONE"
230 IF C=2 THEN A$="          WE
IGHING TWO"
240 IF C=3 THEN A$="          WE
IGHING THREE"
245 IF C=4 THEN GOTO 500
250 R=0:L=0:FOR W=1 TO 6: READ L
H(W):NEXT W
260 FOR U= 1 TO 6: READ RH(U):NE

```

```

XT U
270 PRINT:PRINT:PRINTA$
280 PRINT:INPUT"TOTAL NUMBER OF
BALLS ON each SIDE";N
290 FOR E=1 TO N
300 PRINT:INPUT"NUMBER OF BALL O
N LEFT SIDE";B
310 GOSUB 620
320 IF B=X THEN L=Y1
330 LH(E)=B
340 NEXT E
350 FOR E=1 TO N
360 PRINT:INPUT"NUMBER OF BALL O
N RIGHT SIDE";B
370 GOSUB 620
380 IF B=X THEN R=Y1
390 RH(E)=B
400 NEXT E
410 H=144:V=80
420 GOSUB 640
430 HGET(10,61)-(155,108),1:HGET
(165,61)-(310,108),2
440 V1=61:V2=61
450 IF L>R THEN GOSUB 1010
460 IF L<R THEN GOSUB 1080
470 IF L=R THEN HPRINT (11,23),"
THE SCALE BALANCES"
480 FOR LA=1 TO 600:NEXT LA
490 NEXT C
500 CLS3:ATTR3,2:PRINT:PRINT:PRI
NT:PRINT
510 PRINT"          WHAT IS YOUR ANS
WER?"
520 INPUT"          WHICH BALL IS DE
VIA NT";J
530 IF J=X THEN PRINT"CONGRATULA
TIONS" ELSE IF J<>X GOTO 570
540 PRINT"          Is it Heavier or
Lighter?"
550 INPUT"          ENTER H OR L";J$
560 IF J$=LEFT$(Y$,1) THEN PRINT
"RIGHT AGAIN":GOTO 590
570 PRINT"SORRY,IT WAS" ;X;" AND
IT WAS ";Y$:GOTO 590
580 PRINT"SORRY.IT WAS ";Y$
590 INPUT"ANOTHER EXAMPLE";K$
600 IF K$="Y" THEN PRINT"TYPE 'R
UN' (AVOIDS DD ERROR IN 10)
605 IF K$="N" THEN PRINT"THAMKS,
POOL BALL FANS"
610 END
620 IF B<1 OR B>12 THEN PRINT"BA
LL MUST BE NOT < 1 NOR > 12"
625 IF B<1 OR B>12 THEN PRINT "P
RESS BREAK AND RUN AGAIN"
630 RETURN

```



```

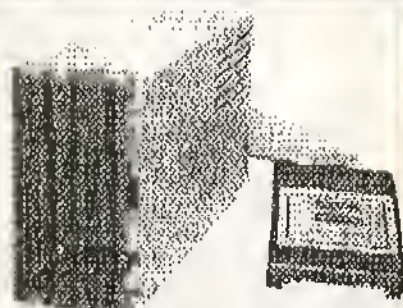
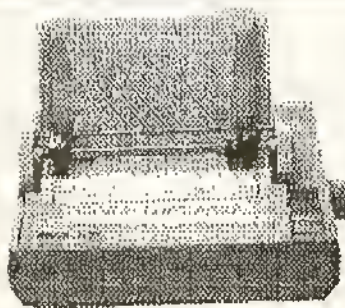
640 REM GRAPHICS
650 HSCREEN2
660 HCOLOR 12,11
670 HDRAW"BM10,92;C12;R146;U74;R
8;D74;R146;D8;L146;D74;L8;U74;L1
46;U8"
680 HPAINT(14,95),3,12
690 FOR F=1 TO N
700 B=LH(F):GOSUB 800
710 IF F<N THEN H=H-24
720 NEXT F
730 H=176
740 FOR G=1 TO N:B=RH(G):GOSUB 8
00
760 IF G<N THEN H=H+24:NEXT G
780 RESTORE:RETURN
800 IF B=8 THEN HCIRCLE(H,V),11,
13
810 IF B=8 THEN HCIRCLE(H,V),4,1
3
820 IF B<>8 THEN HCIRCLE(H,V),11
,12
830 IF B<8 THEN HCIRCLE(H,V),4,1
2
840 IF B>8 THEN HLINE(H-3,V-11)-
(H-3,V+11),PSET
850 IF B>8 THEN HLINE(H+3,V-11)-
(H+3,V+11),PSET
860 GOSUB 880
870 RETURN

```

```

880 IF B=1 THEN HPAINT(H-8,V),1,
12
890 IF B=2 THEN HPAINT(H-8,V),2,
12
900 IF B=3 THEN HPAINT(H-8,V),3,
12
910 IF B=4 THEN HPAINT(H-8,V),6,
12
920 IF B=5 THEN HPAINT(H-8,V),7,
12
930 IF B=6 THEN HPAINT(H-8,V),9,
12
940 IF B=7 THEN HPAINT(H-8,V),5,
12
950 IF B=8 THEN HPAINT(H-8,V),12
,13
960 IF B=9 THEN HPAINT(H,V),1,12
970 IF B=10 THEN HPAINT(H,V),2,1
2
980 IF B=11 THEN HPAINT(H,V),3,1
2
990 IF B=12 THEN HPAINT(H,V),6,1
2
1000 RETURN
1010 FOR M=1 TO 10
1020 V1=V1+4:V2=V2-4
1030 HPUT(10,V1)-(155,V1+47),1,P
SET
1040 HPUT(165,V2)-(310,V2+47),2,
PSET

```



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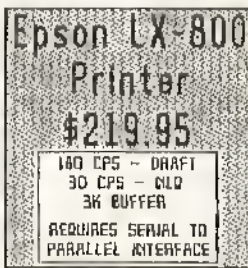
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```

1050 NEXT M
1060 HPRINT(1,23),"LEFT SIDE HEAVIER OR RIGHT SIDE LIGHTER"
1065 FOR LA=1 TO 600:NEXT LA
1070 RETURN
1080 FOR M=1 TO 10
1090 V1=V1-4:V2=V2+4
1100 HPUT(10,V1)-(155,V1+47),1,PSET
1110 HPUT(165,V2)-(310,V2+47),2,PSET
1120 NEXT M
1130 HPRINT(1,23),"RIGHT HAND HEAVIER OR LEFT HAND LIGHTER"
1135 FOR LA=1 TO 600:NEXT LA
1140 RETURN

```

✓	90	168
	260	240
	1340	231
	END	57

Listing 2: BALL2

```

3 X=RND(-TIMER)
5 DIM LH(0,175):DIM RH(0,175)

```

```

7 PRINT:PRINT
10 PRINT:PRINT:PRINT:PRINT"THIS IS A TOOL TO DETERMINE IF"
11 PRINT"YOUR TECHNIQUE CAN SOLVE THE 12"
12 PRINT"POOL BALL PROBLEM"
15 PRINT"IT WILL ALLOW YOU TO WEIGH UP"
16 PRINT"TO SIX BALLS ON EITHER SIDE"
17 PRINT"(SILLY, BUT ALLOWED)"
20 PRINT"THE RESULTS OF EACH WEIGHING WILL BE DISPLAYED."
25 PRINT"CAN YOUR TECHNIQUE SOLVE every POSSIBILITY?"
30 INPUT "READY (Y/N)";A$
35 IF A$="Y" THEN CLS
40 X=RND(12):Y=RND(1000)
45 IF Y>501 THEN Y$="HEAVY"
48 IF Y<500 THEN Y$="LIGHT"
50 IF Y$="HEAVY" THEN Z=1
55 IF Y$="LIGHT" THEN Z=-1
60 FOR W=1 TO 4
65 IF W=1 THEN W$="ONE"
70 IF W=2 THEN W$="TWO"
75 IF W=3 THEN W$="THREE"
80 IF W=4 GOTO 240
90 CLS:PRINT:PRINT:PRINT"WEIGHING ";W$
95 L=0:R=0
100 PRINT:INPUT "HOW MANY BALLS DO YOU WISH ON each SIDE OF THE FULCRUM";N1
105 PRINT
106 FOR E=1 TO N1
110 INPUT "NUMBER OF BALL ON LEFT";LB
120 GOSUB 1600
130 NEXT E
160 PRINT:FOR F=1 TO N1
170 INPUT "NUMBER OF BALL ON RIGHT SIDE";RB
180 GOSUB 1650
190 NEXT F
221 PRINT
225 GOSUB 1000
230 NEXT W
240 CLS:PRINT:PRINT:PRINT:INPUT "WHICH BALL IS DIVIANT";A1
245 IF A1<X THEN PRINT"SORRY. THE BALL WAS";X;"AND IT WAS ";Y$: INPUT"TRY AGAIN(Y/N)";I$:GOTO 270
250 IF A1=X THEN INPUT "RIGHT. Heavy or Light";A1$
260 IF A1$=LEFT$(Y$,1) THEN PRINT "RIGHT AGAIN"
261 IF A1$="" THEN 260
262 IF A1$<>LEFT$(Y$,1) THEN PRINT"SORRY. IT WAS";Y$
265 INPUT "ANOTHER EXAMPLE?(Y/N)"

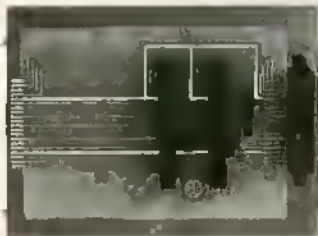
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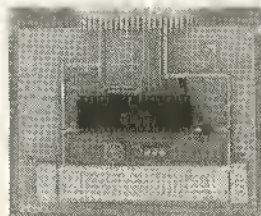
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9-6 M-F (MST)


```

";I$
270 IF I$="Y" THEN GOTO 40
280 IF I$=" " THEN GOTO 280
290 IF I$="N" THEN PRINT "END"
295 END
1000 PMODE 3,1:PCLS
1010 SCREEN 1,1:COLOR 2,1
1020 DRAW "C3;BM 0,96;D8;R123;D6
0;R8;U60;R123;U8;L123;U84;L8;D84
;L123"
1030 PAINT(4,100),4,3
1040 V=84:H=106
1050 FOR G=1 TO N1
1060 CIRCLE(H,V),11,3
1070 H=H-20:IF N1=G THEN GOTO 12
00
1080 NEXT G
1200 H=148:FOR G=1 TO N1
1210 CIRCLE(H,V),11,3
1220 H=H+20:IF N1=G THEN GOTO 13
00
1230 NEXT G
1300 REM FILLS IN MISSING LINE
1310 GET(0,66)-(123,114),LH,G
1320 GET(133,66)-(256,114),RH,G
1325 V1=64:V2=64:H1=0:H2=123:H3=
133:H4=256
1330 IF L=R GOTO 1340 ELSE 1350

```

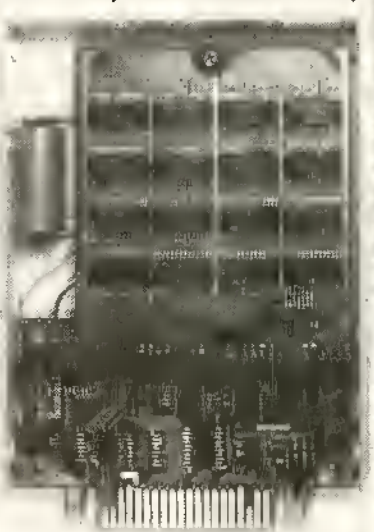
```

1340 FOR T=1 TO 300:NEXT T:PRINT
@480,"THE SCALE BALANCES"
1345 FOR U= 1 TO 800:NEXT U
1350 IF L>R THEN GOSUB 1400
1360 IF L<R THEN GOSUB 1500
1370 RETURN
1400 FOR M=1 TO 7
1410 V1=V1+8:V2=V2-8
1430 PUT(H1,V1)-(H2,V1+48),LH,PS
ET
1440 PUT(H3,V2)-(H4,V2+48),RH,PS
ET
1450 NEXT M
1480 PRINT@448,"LEFT HAND SIDE H
EAVIER":FOR T= 1 TO 800:NEXT T
1490 RETURN
1500 FOR M= 1 TO 7
1510 V1=V1-8:V2=V2+8
1520 PUT(H1,V1)-(H2,V1+48),LH,PS
ET:PUT(H3,V2)-(H4,V2+48),RH,PSET
1530 NEXT M
1560 PRINT@448,"RIGHT HAND SIDE
HEAVIER":FOR T= 1 TO 800:NEXT T
1570 RETURN
1600 IF LB=X THEN L=Z
1610 RETURN
1650 IF RB=X THEN R=Z
1660 RETURN

```

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A program editor for the CoCo 3

CoCo's Current Companion

By Marc Campbell

Since the entry of the CoCo 3 into the world of microcomputing, the capabilities of amateur programmers have increased significantly. Every Joe Average Hacker with access to a Color Computer can now utilize 640-by-192 resolution graphics, 64 colors, 80-column screens, and error-trapping techniques without ever learning assembly language. For all CoCo's strong points, however, its 3 users are still plagued with the antique Color BASIC 1.0 program editor. How many times have you muttered curses after keying in a long line of hexadecimal DATA statements only to press CLEAR instead of ENTER? How many times have you irrevocably lost valuable bytes of code with the clumsy EDIT command? How many times have you dreamed of full-fledged cursor control with auto-key repeat?

Buddy is a program editor worthy of the Color Computer 3. Don't be fooled by its juvenile name or cartoon-like title screen; *Buddy* is quite a powerhouse. It supports 40- and 80-column text, disk and tape systems, and 128K or 512K machines. With 49,000 bytes (128K) or 442,250 bytes of workspace (512K), you will be limited only by the amount of memory the computer allocates to BASIC (usually 24,872 bytes). In addition, *Buddy* possesses many of the

advanced editing features of expensive word processors. Simply key in Listing 1 (knowing that it may be the last time you will ever need to use the original BASIC editor) and save it to tape or disk.

To execute the program, type RUN and press ENTER. You will be greeted by a colorful title screen in 320-by-192 resolution graphics. Press any key to begin. You are asked to press 1 if your CoCo has 128K or 2 if it has 512K; respond appropriately. You are now ready to use *Buddy*.

The top line on the screen is known as the memory bar. The first number

displayed is the number of 250-character lines that may be entered into memory. The second number tells you how many more characters may be entered on the current line. The various letters you will find on the memory bar will be explained later.

Entering Text

Buddy allows you to enter program lines as you normally would using the CoCo's built-in editor. Lines may be entered in any order; the computer will arrange them in numerical order when you load the program into BASIC. No

Variable Descriptions

AS	Contains character of key pressed	RS	Replacement string
CS	Name of the command being executed	RT\$	Right portion of a line
CLS	Line that has been cut and pasted	TS	Target string
ES	PLAY string for error tone	AL	Returns a 1 if automatic line numbering is on
LS	Line currently being edited	AZ	Dummy variable
LN\$	Line being manipulated by a command	BK	Background palette color
LT\$	Left portion of a line	C	Printout width
NBS	Line number being searched for	CH	Character's palette color
PS	PLAY string for key click tone	CP	Returns a 1 if cut and paste is on
QS	Dummy variable	CW	Command window palette color
		DV	Input/output device number

Marc Campbell, a self-taught programmer, is a senior in high school, where he participates in drama and is an editor and award-winning writer for the school newspaper.



two lines may have the same number; although *Buddy* will recognize them as separate lines, BASIC will not.

For now, type in a line of BASIC code (you *must* include a space after the line number), but do not press ENTER just yet. *Buddy* allows for four-directional cursor control. Move the cursor left, right, up, and down by pressing the appropriate arrow key. (The CLEAR key generates an up-arrow character.) Holding down an arrow key speeds the cursor through your text automatically. You may edit any portion of the line simply by positioning the cursor and typing over the old text. (Since the LOCATE command wipes out the character under the cursor, some of your line may seem to vanish. Press SHIFT and the left arrow key to reprint the line in its entirety.)

Suppose you want to delete a character in your line. Position the cursor under the character you want erased and press F1. *Voila!* The character never knew what hit it. (Notice how the rest of the line moves over one space to the left to fill the gap.) To insert a space in the line, position the cursor under the character you want the space to precede and press F2.

If you want to lop off part of the line you're entering, press SHIFT-F2. The character under the cursor and everything after it are deleted.

At the moment, *Buddy* is operating in overstrike mode, which means char-

acters that are typed over are replaced. By pressing ALT, you may enter the insert mode. (The O for overstrike on the memory bar turns to an I for insert.) Position the cursor under a character in your line, enter insert mode, and type several characters. Notice how insert mode works; the rest of the line is pushed one space to the right to make room for the new characters. The keyboard does not respond as quickly in insert mode as it does in overstrike, so take your time when typing. You may not begin a line in insert mode; return to overstrike mode by pressing ALT again.

As you know, the CoCo 3 is capable of producing true lowercase letters. Press SHIFT-0 to toggle between uppercase mode (all caps) and lowercase mode (mixed). The memory bar returns a U for uppercase or L for lowercase, depending on the mode you are in.

If you have ever typed in a program from THE RAINBOW, you know that the magazine formats program listings in 32 columns. This way, you can check to see if the position of the character at the far right of your 32-column screen matches the position of the one in the magazine as a method of proofreading your own work. Press SHIFT-CTRL to see the line you are currently typing on a 32-column screen; press any key to return to the editor.

Now that you have experimented

with some of the program's features, position the cursor wherever you want the line to end and press ENTER. You are asked if you are finished with the current line; press Y for yes or N for no. If you choose no, you will be returned to the line. Press SHIFT and the left arrow key to restore any erased characters, and continue editing. If you select yes, the line is sent to memory. After a moment's wait, the screen will clear and you may enter another line.

Commands

Press CTRL and you will be sent into command mode. A portion of the screen called the command window is blocked off, and you will be prompted to enter a command. There are nineteen commands recognized by *Buddy*. At any time during a command, press ESC/BREAK to return control to the editor. (The proverb made famous by *Telewriter*, "When in doubt press BREAK," applies.) All of the command procedures are well-prompted in plain English messages for maximum user-friendliness.

A (Automatic Line Numbering): This command toggles the automatic line numbering feature. Specify the starting line number and the interval of increase, and *Buddy* takes care of the rest. For instance, if you define the starting line as 10 and the interval as 20, the computer would number your program's

ED	Returns a 1 if edit mode is on	LL (x)	Array containing the length of Line X	Q	Dummy variable
EE	Length of line being cut and pasted	LN	Line number being searched for	QQ	Dummy variable
EL	End position of line being edited	LP	Position of cursor in line	S	First address editor may LPoke to
EN	End position of portion being cut	LU	Number of lines used	SR	Starting line of automatic line numbering
I	Returns a 1 if insert mode is on	LX	Line being edited	ST	Start of portion of line being cut
IC	Increment of automatic line numbering	MU	Bytes of memory used	W	Width of editing screen
IR	Returns a zero if no occurrences of target found	MX	Dummy variable	X	Horizontal position of cursor
L	Maximum number of lines	MY	Dummy variable	XQ	Dummy variable
LC	Number of occurrences of target in line	NC	Total number of occurrences of target	XX	Dummy variable
		PL	Position in line being searched	Y	Vertical position of cursor
		PS	Memory position of search	Z	Returns a zero if line numbering was just turned on
		PT	Position of editor in the program	ZZ	Dummy variable

lines as follows: 10, 30, 50, 70, 90, etc.

B (Return to BASIC): This command sends you back to BASIC.

C (Cut & Paste): This command lets you take part of a line and move it to another location. Upon executing this command, position the cursor at the beginning of the portion you want to cut, and press S for start position. Move the cursor to the end of the portion you want to cut and press E. Finally, position the cursor at the spot you want the cut portion to move and press M. After verification, the line will be cut and pasted.

D (Disk Directory): This command does a disk directory and displays the number of free granules remaining. Press any key to return to the editor.

E (Edit Line): This command allows you to edit a line you previously typed in. An E for edit mode will appear on the memory bar. You may not execute another command while in edit mode. Press ENTER to return to the normal mode of operation.

F (Find Text): This command causes the computer to search through memory for a target string. When it finds the string, it displays the line that contains the string and asks you if you want to continue the search. Press Y or N. The search continues until you abort by pressing N or no more occurrences can be found. If you do press N, you will be sent (in edit mode) to the line that contains the target string.

G (Global Replace): This command works like Find Text above, but the computer will change every occurrence of the target string it finds to a replacement string. If the replacement string plus the original line take up more than 250 characters, none of the occurrences in the line will be changed.

H (Alter Colors): This command changes the colors of the display. Input the palette color (0-63) for the characters, background and command window.

K (Kill Disk File): This command kills a file saved to disk.

L (Disk Load): This command loads any ASCII-saved program with the extension .BAS into memory so that *Buddy* may edit it. The loading process

Lines	Description
1 - 12	Draw the title screen. POKE&HE67B,&H39;HSCREEN2: POKE-&HE6B7,&H20 prevents the computer from switching to the Hi-Res screen while the actual drawing and painting is taking place. The line POKE&HE6E4,&HE6;HSCREEN2:POKE&HE6E4,&HE7 undoes the previous pokes.
13 - 15	Initialize the program.
16 - 17	Prepare the computer for the incoming line.
18	Checks to see if a key is being pressed.
19	Generates an up arrow if CLEAR is pressed.
20	Hacks line at cursor if SHIFT-F2 is pressed.
21	Follows a routine if ENTER is pressed.
22	Deletes the character under the cursor if F1 is pressed.
23	Inserts a character at the cursor if F2 is pressed.
24	Jumps to command mode if CTRL is pressed.
25	Toggles between insert and overstrike modes if ALT is pressed.
26	Controls the cursor if the left arrow key is pressed.
27	Controls the cursor if the right arrow key is pressed.
28	Controls the cursor if the down arrow key is pressed.
29	Controls the cursor if the up arrow key is pressed.
30	Rewrites a line if SHIFT-left arrow is pressed.
31	Prints a line on 32-column screen if SHIFT-CTRL is pressed.
32	Sounds the error tone if an illegal key is pressed.
33	Stops the computer from accepting any characters if the workspace is filled. The computer jumps to Line 35 if it is in insert mode; otherwise, the character is added to the line.
34	Stops the computer from extending a line past 250 characters.
35	Prints the character of the key that was pressed.
36	Adds the character to the line if the computer is in insert mode; everything following it is shifted one space to the right.
37-38	Call a subroutine to prevent the computer from locating an illegal position.
39-41	Call a subroutine when ENTER is pressed.
42-47	Call a subroutine for auto-key repeat of cursor control.
48-53	Call an error-trapping routine.
54-58	Call a subroutine to print the memory bar.
59	Calls a routine for entering command mode. You are asked to select a command, provided you are not in edit mode.
60-78	Contain various commands; check the value of C\$ in each line to determine which command the line controls.
79	Sounds the error tone if an illegal command is selected, and the computer returns to Line 57.
80-88	Contain the global find and replace subroutine.
89-95	Contain the single-line find and replace subroutine.
96	Calls a subroutine to center the command name on the screen.
97-103	Find the text subroutine.
104	Reformats the editor screen and closes any open devices. Pressing ESC/BREAK sends you to this line.
105	Erases the command window and returns to the line being edited.
106-107	Contain an initialization routine for the automatic line numbering command.
108-111	Search for a particular line number.
112-113	Contain the output to printer routine.
114-115	Call a subroutine to generate a "Press any key to continue" prompt.
116-117	Call a subroutine to generate an "Are you sure? (Y/N)" prompt.
118-119	Contain the Save routine.
120-127	Contain the Load routine.
128-146	Contain the Cut and Paste routine.
147	Calls a subroutine to bypass the CLOSE#1 command on non-disk systems, which would otherwise generate a DN Error.

will stop after the program is completely in memory or after the workspace is filled (whichever comes first).

M (Memory Used): This command displays the number of bytes your program consumes.

N (Erase Memory): This command clears the workspace, as the NEW command of BASIC.

P (Output To Printer): This command sends the program to your printer. You may specify the width of the printout.

Q (Key Click): This command toggles the key click feature.

R (Replace Text): This command works identically to Global Replace (CTRL-G) with one exception. Occurrences of the target string in the current line only will be replaced.

S (Disk Save): This command saves your program to disk under the extension .BAS.

T (Cassette Save): As Disk Save

(CTRL-S) above, but output is to the cassette recorder.

U (Cassette Load): As Disk Load (CTRL-L) above, but the computer receives input from the cassette recorder.

W (Alter Width): This command toggles between 40 and 80 columns of text.

Error Messages

Using the ON ERR GOTO command, *Buddy* makes use of error-trapping for crash-free operation. The computer reports errors above the memory bar by printing WARNING: and the appropriate error message.

Out Of Range: You have input a number or string that is out of the computer's range (i.e., attempting to change the background to Color 100).

Overflow: More commonly called the "Wise Guy Error." You cause an overflow if you input a number that the computer cannot handle (anything larger than nine digits).

Input/Output Error: The computer is

having difficulty reading or writing to your tape or disk. Check to make sure the device has been turned on.

Disk Error: Any number of things may be going wrong: the disk may not be formatted, the file you specified may not exist, the disk may have write-protection tabs on it, the disk may be garbled, etc. Physically examine your disk, or experiment with it in BASIC, to get to the source of the problem.

If the computer encounters an error that does not fit into any of these categories, you will be returned to the standard 32-column screen. On the top line you will find the error number and the line that is generating the error. There is probably a typographical error in the line somewhere, but more serious errors may be the result of an oversight on my part. Write me if you discover a chronic bug that you just can't squash.

Shortcomings

Since *Buddy* was written in BASIC, there are certain features of the built-in editor that my program cannot duplicate. For example, no matter if each line contains two or 200 characters, you'll

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never fit more than 196 lines (1769 lines with 512K) into memory. If the program you are keying in contains more than the maximum number of lines, save the first part to either tape or disk and erase memory (CTRL-N). Continue typing in the program until you are finished or until you fill the workspace again, saving each section under a different filename. When you have completed the program and all its components are saved, return to BASIC (CTRL-B). Load

the first portion into memory. For disk systems, type MERGE "filename.BAS" for each additional component. Tape users should input the command OPEN #1, "filename": POKE 111, 255: EXEC &HAC7C for each additional component. When the entire program is safely tucked away into memory, resave it to tape or disk.

If you ever want to delete a line that you have already sent to memory, I recommend you execute the Edit Line

command (CTRL-E), position the cursor after the space that follows the line number, and press ENTER. This way, if you need room for another line, you may edit the "empty" line and change its line number.

(Questions or comments concerning this program may be directed to the author at 266 Riverview Drive, Ephrata, PA 17522. Please enclose an SASE when requesting a reply.) □

9.....24	78.....217
16.....52	89.....78
23.....129	101.....253
30.....155	111.....26
45.....35	122.....167
59.....234	131.....71
65.....121	138.....120
71.....60	END.....102

The listing: BUDDY

```
1 PCLEAR1:HSCREEN0:WIDTH32:PRINT
@202,"INITIALIZING":POKE&HE6B7,&
H39:HSCREEN2:POKE&HE6B7,&H20
2 POKE&HFFD9,0:ONBRKGOTO1:CMPI:PA
LETTE9,15:HCLS5:HCOLOR8:HDRAW"BM
100,40R120F5D80G5L120H5U80E5":HD
RAW"BM110,50R100F5D60G5L100H5U60
E5":HDRAW"BM120,65E5R15BR40E5F10
":HDRAW"BM135,65G5F5R5U5":HDRAW"
BM180,70D5R5E5H5":HDRAW"BM165,65
D25L5"
3 HCIRCLE(160,93),35,,.15,0,.5:H
CIRCLE(160,93),35,,.5,0,.5
4 HPAINT(120,70),0,8:HPAINT(160,
108),4,8:HPAINT(97,70),4,8
5 HLINE(100,130)-(85,145),PSET:H
LINE-(235,145),PSET:HLINE-(220,1
30),PSET:HLINE(100,135)-(95,140)
,PSET:HLINE-(225,140),PSET:HLINE
-(220,135),PSET:HLINE-(100,135),
PSET
6 HPAINT(101,132),4,8:HPAINT(106
,138),9,8:HCOLOR3:HLINE(101,133)
-(120,133),PSET:HCOLOR8:HLINE(85
,145)-(235,150),PSET,B:HPAINT(86
,146),4,8
7 HPRINT(4,20),"THE FRIENDLY PRO
GRAMMING UTILITY"
8 HCOLOR4:HPRINT(4,22),"(C) MCML
XXXVIII BY MARC CAMPBELL"
9 HCOLOR8:HDRAW"BM35,10D20R50U5H
5E5U5NL50D20R50U20L20D10L10U10L2
0":HDRAW"BM135,10D20R45E5U10H5L4
5":HDRAW"BM185,10D20R45E5U10H5L4
5":HDRAW"BM235,10D10R20D10R10U10
R20U10L20D5L10U5L20"
```

```
10 HPAINT(36,11),1,8:HPAINT(86,1
1),1,8:HPAINT(136,11),1,8:HPAINT
(186,11),1,8:HPAINT(236,11),1,8
11 POKE&HE6E4,&HE6:HSCREEN2:POKE
&HE6E4,&HE7:A$=INKEY$:A$=""
12 IFINKEY$=""THENPALETTE1,Q:Q=Q
+1:IFQ=64THENQ=0:GOTO12ELSE12
13 ATTR0,0:WIDTH40:CMPI:CLS1:CLEA
R2500:LOCATE2,10:PRINT"Are you u
sing (1) 128K or (2) 512K?":ONBR
KGOTO13
14 EXEC44539:A$=INKEY$:IFA$="1"TH
HENL=196:S=393216ELSEIFA$="2"THE
NL=1769:S=0ELSEPLAY"V31L3501C":G
OTO14
15 PLAY"L3003C":DIMLL(L-1):PT=S:
W=40:E$="V31L3501C":P$="V31L2550
1C":POKE&HFFD9,0:ONERRGOTO48:VER
IFYON:CH=0:BK=18:CW=63:ONBRKGOTO
104
16 ATTR0,0:PT=S+(250*LU):L$=STRI
NG$(250,0):EL=1:LP=1:X=0:Y=3:WID
THW:GOSUB54:IFAL=1ANDZ=0THENZ=LU
+1:L$=STR$(SR)ELSEIFAL=1ANDZ>0TH
ENL$=STR$(SR+IC*((LU+1)-Z))
17 IFAL=1THENL$=RIGHT$(L$,LEN(L$
)-1)+" ":EL=LEN(L$)+1:LP=EL:LOCA
TEX,Y:PRINTL$;:HSTATQ$,Q,X,Y:L$=
L$+STRING$(250-LEN(L$),0)
18 LOCATEX,Y:A$=INKEY$:IFA$=""TH
EN18ELSEPLAYP$:IFASC(A$)>31ANDAS
C(A$)<123ANDAS<>"^"ANDPEEK(343)<
>191ANDPEEK(341)<>191THEN33
19 IFA$=CHR$(12)THENA$="^":GOTO3
3
20 IFA$=CHR$(214)ANDLP<EL THENPR
INTSTRING$(7,13):MID$(L$,LP,250-
LP)=STRING$(250,0):EL=LP:IFED=0T
HENLL(LU)=EL:GOTO18ELSELL(LX)=EL
:GOTO18
21 IFA$=CHR$(13)THENPRINTSTRING$
(6,13):LOCATE(W-40)/2,11:PRINT"A
re you finished editing this lin
e (Y/N)":EXEC44539:A$=INKEY$:IFA
$="Y"ORA$="Y"THEN39ELSELOCATE(W-
40)/2,11:PRINT:A$="":GOTO18
22 IFA$=CHR$(103)ANDEL>1ANDLP<>E
L ANDLP<249THENLFS=LEFT$(L$,LP):
RT$=MID$(L$,LP+1,250):L$=LEFT$(L
```



```

F$,LP-1)+RT$+CHR$(0):LOCATE0,3:P
RINTL$:EL=EL-1:GOSUB54:GOTO18ELS
EIFPEEK(343)=191THENPLAYE$:GOTO1
8
23 IFA$=CHR$(4)ANDEL<249ANDLP<>E
L THENLF$=LEFT$(L$,LP-1):RT$=MID
$(L$,LP,250):L$=LF$+" "+RT$:L$=L
EFT$(L$,250):LOCATE0,3:PRINTL$:E
L=EL+1:GOSUB54:GOTO18ELSEIFPEEK(
344)=191THENPLAYE$:GOTO18
24 IFA$=CHR$(189)THEN59
25 IFPEEK(341)=191ANDI=0THENI=1:
GOSUB54:GOTO18ELSEIFPEEK(341)=19
1ANDI=1THENI=0:GOSUB54:GOTO18
26 IFA$=CHR$(8)THENLP=LP-1:IFLP<
1THENLP=1:PLAYE$:GOTO18ELSEGOSUB
54:X=X-1:IFX<0THENX=W-1:Y=Y-1:GO
TO42ELSE42
27 IFA$=CHR$(9)THENLP=LP+1:IFLP>
EL THENLP=EL:PLAYE$:GOTO18ELSEIF
LP=251THENLP=250:PLAYE$:GOTO18EL
SEGOSUB54:X=X+1:IFX>W-1 THENX=0:
Y=Y+1:GOTO42ELSE42
28 IFA$=CHR$(10)THENLP=LP+W:IFLP
>EL THENLP=LP-W:PLAYE$:GOTO18ELS
EIFLP=251THENLP=250:PLAYE$:GOTO1
8ELSEGOSUB54:Y=Y+1:IFY>24THENY=2
4:GOTO42ELSE42
29 IFA$=CHR$(94)THENLP=LP-W:IFLP

```

```

<0THENLP=LP+W:PLAYE$:GOTO18ELSEG
OSUB54:Y=Y-1:IFY<0THENY=0:GOTO42
ELSE42
30 IFA$=CHR$(21)THENLOCATE0,3:PR
INTL$:GOTO18
31 IFA$=CHR$(1)THENWIDTH32:PRINT
L$:EXEC44539:A$=INKEY$:A$="":WID
THW:GOSUB54:PRINT:PRINTL$;:GOTO1
8
32 PLAYE$:GOTO18
33 IFLU+1>L THENPLAYE$:GOTO18ELS
EIFI=1THEN36ELSEMID$(L$,LP,1)=A$
:LP=LP+1:IFLP>EL THENEL=LP
34 IFLP=251THENPRINTA$;:PLAYE$:L
$=LEFT$(L$,250):LP=250:GOTO18
35 PRINTA$;:HSTATQ$,Q,X,Y:LOCATE
0,0:ATTR0,0,U:PRINT:GOSUB54:GOTO
18
36 IFEL<249ANDLP<>EL THENLF$=LEF
T$(L$,LP-1):RT$=MID$(L$,LP,250):
L$=LF$+A$+RT$:L$=LEFT$(L$,250):L
OCATE0,3:PRINTL$:EL=EL+1:MU=MU+1
:X=X+1:LP=LP+1:GOSUB37:GOSUB54:G
OTO18ELSEPLAYE$:GOTO18
37 IFX>W-1 THENX=0:Y=Y+1
38 RETURN
39 IFED=1THENED=0:LL(LX)=LP:LX=0
ELSELL(LU)=LP:LU=LU+1
40 MID$(L$,LP,250)=CHR$(13)+STRI

```



Happy
Independence Day
To all of our OS
Customers!

Wild & MV Version 2.0 Use "wildcards" with most OS9 commands, or rearrange your directory tree. Features recursive directory searches. Great for hard disks. \$19.95

EZGen Version 1.0 Powerful OS9 bootfile editor. Change module names, add or delete modules, patch bytes, or rearrange modules. Works on other files, too. \$19.95

Daggorpach If you own Dyna Micro's Dungeons of Daath™ cartridge, this program will convert it to run from disk! Adds disk load and save, quit, screen print, repeat last command, pause, and more. HYPER-I/O and RS-DOS compatible. \$12.95

R. S. B.

We broke out the champagne. It was revolutionary! Who ever thought you could run BASIC, in an OS9 window?

Everyone knows that BASIC and OS9 are incompatible. The commands are completely different. The floppy disks are completely different. BASIC programs won't run under OS9.

Future Shock

Some people say that they "hate" OS9. Many people who buy OS9 don't use it, because it's unlike anything they've ever seen before. Well, like it or not, Level 2 OS9 is the future of the CoCo. Even the newest games use OS9 now.

Burke & Burke has developed a new program, RSB, to help you take that first step towards falling in love with Level 2 OS9.

BASIC Clone?

The first time you run RSB, it copies your RS-DOS ROMs to an OS9 disk file. Our proprietary installation software converts this disk file to an OS9 "shell" that can be run like any other OS9 program. You can even program the CoCo to automatically use RSB as your "shell" whenever you start up OS9.

RSB won't run machine language programs, but you can use all of the familiar Super Extended BASIC™ commands and program statements. You can even take advantage of OS9's built-in "windows" to run several BASIC programs at once! And RSB runs at the full 2 MHz speed of the CoCo — always.

If you have a Speech Sound PAK™, or a Super Voice™, RSB upgrades will allow you to use these devices to execute commands like PLAY and SOUND "NO HALT".

Break out the champagne. Break out the OS9. Break out RSB. \$39.95

Hard Disk Mania Sweeps America!

Exports Blame "Incredibly Sane" Low-Cost, High-Performance Interface

This year, 1988, may go down in CoCo history as "The Year of the Hard Disk". Burke & Burke has provided hundreds of low-cost, high performance hard disk interfaces to a very hot Color Computer market in only six months!

Hire a Veteran Today.

The CoCo XT hard disk interface from Burke & Burke lets you connect up to 2 low cost, PC compatible 5-120 Megabyte capacity hard drives to your CoCo. You buy the drive, Western Digital WD1002-WX1 or WD1002-27X (RL) controller, and a case from the PC dealer of your choice. Just plug them into the CoCo XT, plug the CoCo XT into your Multi-PAK, and you have a 20 Meg OS9 hard disk system for under \$450!

Goal for multi-user systems! The CoCo XT interface uses advanced "NO HALT" hard disk controllers, which do not halt your CoCo and do not disable or use interrupts during hard disk access. You get full type-ahead, and the system clock does not lose time during hard disk access. Fully compatible with most RS-232 expansion ports!

CoCo XT (with anodized housing, 60 page user manual, hard disk back-up utility and new, Version 2.1 drivers for use with both OS9 & HYPER-I/O) — \$69.95. Or choose the CoCo XT-RTC (includes real-time clock / calendar with battery backup) — \$99.95

THE PROFESSIONAL TOUCH: XT-ROM — Automatically boots and reboots OS9 from hard disk. Installs in your hard disk controller's BIOS ROM socket — \$19.95.

Now: Hard Disk for BASIC

"Dynamic Disk Interface" runs hard drives, big floppies, and more!

You or someone that you know may have the 35 Track Blues. It strikes hundreds of CoCo users every year. One day you wake up, and say to yourself, "These 35 track floppy disks are just too small."

There's only one cure. More storage. Get it. With HYPER-I/O, from Burke & Burke.

BASIC for the '80's

HYPER-I/O modifies the RS-DOS Disk BASIC in your CoCo 1, 2, or 3 to provide a "Dynamic Disk Interface". Use your existing BASIC and RS-DOS software with hard disk interfaces (CoCo XT, DISTO), RAM Disks, and any mix of floppy drives from 160K to 720K each. Fully RESET protected, user configurable, expandable, OS9 compatible, EPROM-able HYPER-I/O may soon be THE system of choice for the CoCo 1, CoCo 2, and CoCo 3. HYPER-I/O Version 2.4 now available for only \$29.95.

HYPER-III (RAM Disk and Print Spooler for CoCo 3 HYPER-I/O) — \$19.95



Burke & Burke

P.O. Box 1283 Peotone, IL 60078-1283 (312) 397-2898



ILLINOIS RESIDENTS PLEASE ADD 7% SALES TAX. COD's add \$2.00. Shipping (within the USA) \$2.00 per CoCo XT; \$1.50 per disk or ROM. Please allow 2 weeks for delivery (overnight delivery also available for in-stock items). Telephone orders accepted (312) 397-2898



```

NG$(250-LP,0):FORQ=1TO250:LPOKEP
T,ASC(MID$(L$,Q,1)):PT=PT+1:NEXT
41 GOTO16
42 LOCATEX,Y:PLAYPS
43 IFPEEK(343)=247THEN26
44 IFPEEK(344)=247THEN27
45 IFPEEK(342)=247THEN28
46 IFPEEK(341)=247THEN29
47 GOTO18
48 GOSUB147:CLOSE#-1:POKE&HFFD9,
0:ATTR0,0,U:LOCATE0,0:PRINT"WARN
ING: ";IFERNO=4THENPRINT"Out of
Range":GOTO105
49 IFERNO=5THENPRINT"Overflow":G
OTO105
50 IFERNO=20THENPRINT"Input/Outp
ut Error":GOTO105
51 IFERNO=23THENPRINT"Not in ASC
II Format":GOTO106
52 IFERNO>25ANDERNO<38THENPRINT"
Disk Error":GOTO105
53 WIDTH32:PRINTERNO,ERLIN:END
54 LOCATE0,0:ATTR0,0,U:PRINT:LOC
ATE0,1:PRINT"BUDDY ";L-LU;250-LP
;
55 IFPEEK(282)=0THENPRINT"L";ELS
EPRINT"U";
56 IFI=1THENPRINT" I";ELSEPRINT"
O";
57 IFED=1THENPRINT" E"ELSEPRINT
58 ATTR0,0:RETURN
59 IFED=1THENPLAYES:GOTO18ELSELO
CATE0,11:ATTR0,4:PRINTSTRING$(12
,13);:LOCATE(W-19)/2,11:PRINT"Se
lect a command: ";:EXEC44539:A$=
INKEY$:PRINTA$
60 IFA$="W"ORA$="w"THENC$="Alter
Screen Width":GOSUB96:INPUT"Wou
ld you like 40 or 80 columns";Q:
Q=INT(Q):IFQ=40THENW=40:GOTO104E
LSEIFQ=80THENW=80:GOTO104
61 IFA$="H"ORA$="h"THENC$="Alter
Colors":GOSUB96:PRINT"Current C
olors: "CH;BK;CW:INPUT"Characters
, background, command window";CH
,BK,CW:CH=INT(CH):BK=INT(BK):CW=
INT(CW):PALETTE0,BK:PALETTE8,CH:
PALETTE4,CW:GOTO104
62 IFA$="Q"ORA$="q"THENC$="Key C
lick":GOSUB96:INPUT"Key click (1
) on or (2) off";Q:Q=INT(Q):IFQ=
1THENP$="V31L25501C":GOTO105ELSE
IFQ=2THENP$="":GOTO105
63 IFA$="E"ANDLU>0ORA$="e"ANDLU>
0THENC$="Edit Line":GOSUB96:GOTO
108
64 IFA$="B"ORA$="b"THENC$="Retur
n to BASIC":GOSUB96:PRINT"Are yo
u sure you want to exit? (Y/N)";
:EXEC44539:I$=INKEY$:IFI$="Y"ORI
$="y"THENWIDTH32:POKE&HFFD8,0:AT

```

```

TR0,0:CMP:ENDELSE105
65 IFA$="M"ORA$="m"THENMR=0:C$="
Memory Used":GOSUB96:FORQ=0TO195
:MR=MR+LL(Q):NEXT:PRINT"The prog
ram uses"MR"bytes.":GOSUB114:GOT
O105
66 IFA$="S"ANDLU>0ORA$="s"ANDLU>
0THENIFPEEK(188)=14THENLN$="":XX
=0:C$="Disk Save":GOSUB96:DV=1:G
OSUB118:GOTO104
67 IFA$="T"ANDLU>0ORA$="t"ANDLU>
0THENLN$="":XX=0:C$="Cassette Sa
ve":GOSUB96:DV=-1:GOSUB118:GOTO1
04
68 IFA$="L"ORA$="l"THENIFPEEK(18
8)=14THENLN$="":XX=0:C$="Disk Lo
ad":GOSUB96:DV=1:GOSUB120:GOTO10
4
69 IFA$="U"ORA$="u"THENLN$="":XX
=0:C$="Cassette Load":GOSUB96:DV
=-1:GOSUB120:GOTO104
70 IFA$="K"ORA$="k"THENIFPEEK(18
8)=14THENC$="Kill Disk File":GOS
UB96:LINEINPUT"What is the filen
ame? ";F$:F$=LEFT$(F$,8)+".BAS":
POKE&HFFD8,0:KILLF$:GOTO104
71 IFA$="G"ANDLU>0ORA$="g"ANDLU>
0THENC$="Global Replace":GOSUB96
:HSTATQ$,Q,MX,MY:LINEINPUT"Targe
t text: ";T$:LOCATEMX,MY:PRINTST
RING$(7,13):LOCATEMX,MY:LINEINPU
T"Replacement: ";R$:GOTO80
72 IFA$="D"ORA$="d"THENIFPEEK(18
8)=14THENC$="Disk Directory":GOS
UB96:GOSUB114:ATTR0,0:WIDTHW:POK
E&HFFD8,0:DIR:PRINT"Free granule
s: "FREE(0):POKE&HFFD9,0:GOSUB115
:GOTO104
73 IFA$="C"ORA$="c"THENC$="Cut &
Paste":GOSUB96:CP=1:GOSUB108:EE
=LL((Q-S)/249)-1:PRINT"Line"LN"f
ound.":LN$="":FORQQ=Q TO Q+249:L
N$=LN$+CHR$(LPEEK(QQ)):NEXT:GOTO
128
74 IFA$="R"ANDLU>0ORA$="r"ANDLU>
0THENC$="Replace Text":GOSUB96:G
OTO89
75 IFA$="F"ANDLU>0ORA$="f"ANDLU>
0THENC$="Find Text":GOSUB96:LINE
INPUT"Target text: ";T$:GOTO97
76 IFA$="N"ORA$="n"THENC$="Clear
Memory":GOSUB96:LOCATE(W-20)/2,
22:PRINT"Are you sure? (Y/N)";:E
XEC44539:A$=INKEY$:IFA$="Y"ORA$=
"y"THEN13
77 IFA$="A"ORA$="a"THENC$="Autom
atic Line Numbering":GOSUB96:INP
UT"Would you like it (1) on or (
2) off";Q:Q=INT(Q):IFQ=1THENAL=1
:GOTO106ELSEIFQ=2THENAL=0:GOTO10
5

```


Just For the Fun of It

Order any item by August 31, 1988 and you may have your choice of either the **Silly Syntax** story creation game (including two stories) or the **Flying Tigers** arcade game for only \$2.95!

CALLIGRAPHER

CoCo Calligrapher - (Hybrid BASIC/ML) Turn your CoCo and dot-matrix printer into a calligrapher's quill. Make beautiful invitations, flyers, certificates, labels and more. Includes 3 fonts: *Gay Nineties*, *Old English* and *Cartoon*. The letters are 1/4 inch high and variably spaced. Works with many printers including Epson, Gemini, Radio Shack, Okidata 92A, Banana and Pro-writer. Additional fonts are available (see below). Tape/Disk; \$24.95.

OS9 Calligrapher - (C) Although a different program from the CoCo Calligrapher, the OS9 Calligrapher prints all the same fonts. It reads a standard text file which contains text and formatting directives. You may specify the font to use, change fonts at any time, centering, left, right or full justification, line fill, margin, line width, page size, page break and indentation. Similar to *troff* on UNIX systems. Includes *Gay Nineties*, *Old English* and *Cartoon* fonts. Additional fonts are available (see below). Disk only; OS9 Level I or II; \$24.95.

Calligrapher Fonts - Requires Calligrapher above. Each set on tape or disk; specify RSDOS or OS9 version; \$14.95 each. Set #1 - (9 fonts) Reduced, reversed and reduced-reversed versions of *Gay Nineties*, *Old English* and *Cartoon*; Set #2 - (8 fonts) *Old Style* and *Broadway*; Set #3 - (8 fonts) *Antique* and *Business*; Set #4 - (8 fonts) *Wild West* and *Checkers*; Set #5 - (10 fonts) *Stars*, *Hebrew* and *Victorian*; Set #6 - (8 fonts) *Block* and *Computer*; Set #7 - (5 small fonts) *Roman*, *Italics*, *Cubes*, *Digital* and *Old World*.

Economy Font Packages on disk; specify RSDOS or OS9; 29.95: **Font Package #1** - Above font sets 1, 2 and 3 (25 fonts) on one disk. **Font Package #2** - Above font sets 4, 5 and 6 (26 fonts) on one disk. Both Packages #1 and #2 (51 fonts) on one disk; 49.95.

Calligrapher Combo Package - Includes the Calligrapher and both Economy Font Packages, 54 fonts in all; specify RSDOS or OS9; \$69.95.

Sample Calligrapher Fonts

The CoCo Calligrapher!

INFORMATION MGT.

TIMS (The Information Management System) - (Hybrid BASIC/ML) Tape or disk, fast and simple general data base program. Create *files of records* that can be quickly sorted, searched, deleted and updated. Powerful printer formatting. Up to 8 user fields, sort on up to 3 fields. Tape/Disk; \$19.95.

TIMS Mail - (Hybrid BASIC/ML) Tape or Disk based mailing list management program. Files are compatible with TIMS. Fast and simple to use. Supports labels 1, 2 or 3 across, 2 1/4 to 4 inches wide. Tape/Disk; \$19.95.

TIMS Utility - (Hybrid BASIC/ML) Utility companion for TIMS and TIMS Mail for multi-term search (AND and OR logic), global change and delete, split large files and more! Tape/Disk; \$14.95.

TIMS Combo Package - All three of the above programs: TIMS, TIMS Mail and TIMS Utility on one disk - \$34.95.

UTILITIES

OS9 Patcher - (C) Display and modify the contents of a file or memory module. Calculates module CRCs; Disk only; OS9 Level I or II; \$19.95.

Color Disk Manager - (100% ML) Disk utility with these features: Disk repair, selective track initialization, verify sectors, backups, tape to disk transfer, ROM Pak execution from disk, much more! Tape/Disk; CoCo 1, 2, 3 (except for 64K mode); \$24.95.

EDUCATIONAL

Trig Attack - (100% ML) Ages 9 and up. In this educational arcade game, enemy *trigs* travel along math curves. Players learn important mathematical concepts as they play. Sound effects, colorful graphics. Excellent manual includes an introduction to trigonometry. Tape 16K CB/Disk 32K ECB; CoCo 1, 2, 3; \$19.95.

The Educational Combo - The Combo includes these educational (and entertaining) games: **Silly Syntax** (ages 5 and up) story creation game with 2 stories

Galactic Hangman (ages 7 and up) animated graphics, with a 700 word vocabulary

The Presidents of the USA (ages 10 and up) a presidential trivia game

The Great USA (ages 9 and up) a trivia game of the states

Trig Attack (ages 9 and up) Zap those *Trigs*

All five programs on one disk; \$49.95.

SPECIAL INTEREST

Rental Property Income and Expense Management Package - Maintain your rental property income and expense records. Print output supported. 28 expense categories. *This program may be tax deductible.* Disk only; \$29.95.

CoCo Knitter - Easy to use program to display or print instructions to knit a sweater: Cardigan or Pullover; Round or V-neck; Raglan or Set-in Sleeve; 3 weights or yarn; 8 sizes from baby to man. Tape/Disk; \$19.95.



SUGAR SOFTWARE

P.O. Box 7446

Hollywood, Florida 33081

(305) 981-1241

*TRS-80 is a trademark of Tandy Corp.

All programs run on the CoCo 1, 2 and 3, 32K Extended Basic, unless otherwise noted. Add \$1.50 per tape or disk for shipping and handling. Florida residents add 6% sales tax. COD orders add \$5. Dealer inquiries invited. Orders generally shipped in 24-48 hours. No refunds or exchanges without prior authorization.



WE'RE BRINGING THE COCO

RAINBOW'S BROADENING ITS SPECTRUM

THE RAINBOW and the Delphi Information Utility have joined together to allow CoCo owners all over the world to connect with one another!

Delphi is a full-service information utility. It offers everything from up-to-the-minute news stories from The Associated Press to electronic mail services. But, *best of all*, it now has a **special forum for Color Computer owners, and it's operated by the people who bring you THE RAINBOW each month.**

The CoCo Special Interest Group (SIG) features a variety of services, including an open forum where you can send and receive messages from Color Computer owners all over the world. It also has several databases to which you can upload your favorite programs and from which you can download programs written by other CoCo enthusiasts. Some of these databases are BASIC programming, OS-9 and home applications.

When setting up your account with Delphi, if you do not have a credit card or prefer not to use it, Delphi requires that you send \$25 to give your account a positive balance. This will be refunded after your first free hour if you choose to no longer use the system or it will be applied to future connect charges. If you do not maintain a positive balance, you will be charged \$3.50 each month for direct billing.

PEEK INTO THE RAINBOW

The CoCo SIG's conference feature allows you to meet electronically with other members of the CoCo Community. You can join conferences with notables such as Dale Puckett, Cray Augsburg, Marty Goodman, Don Hutchison, Jim Reed, Lonnie Falk and others — on a regular basis. Conference schedules will appear in THE RAINBOW each month. Be sure to check online announcements for changes and additions.

THE OTHER SIDE OF THE RAINBOW

On Delphi, you also are able to buy **RAINBOW ON TAPE** — order a whole set, or download an individual program immediately. You can also renew your RAINBOW subscription, make a fast and easy order for software or hardware from a multitude of vendors, or inquire about products on the CoCo SIG.

We also have a number of **programs that you can download** and use, just for the cost of the time you spend transferring them. There'll also be **corrections for RAINBOW articles**, helpful hints and many other useful features.

FREE LIFETIME MEMBERSHIP

THE RAINBOW is offering subscribers a **free lifetime subscription to Delphi** — a \$24.95 value — and a free hour of connect time — a \$7.20 value at either 300, 1200 or 2400 Baud — so you can sample Delphi and the RAINBOW CoCo SIG. That's right. Your subscription to THE RAINBOW entitles you to this \$32.15 value as a **free bonus!**

If you're not a RAINBOW subscriber, just enter your order when you sign on with Delphi and you'll get the same great deal! For our \$31 subscription fee, you'll get the finest Color Computer magazine ever, a free lifetime subscription to Delphi and a free hour of connect time.

SAVE EVEN MORE

Want to save even more? While you're online you can order, for only \$29.95, a deluxe package which includes the Delphi membership, the *Delphi Handbook and Command Card* (\$21.95) and a total of three hours of connect time (\$21.60).

Delphi provides us all with **Immediate CoCo Community**. Check it out today. After all, you can sample it for free!

Problems? Call Delphi:
(800) 544-4005
(617) 491-3393

DELPHI

TYPE: GROUP COCO



COMMUNITY TOGETHER

How to reach RAINBOW's Color Computer SIG . . .

There are several ways to connect to Delphi and THE RAINBOW's CoCo SIG. In most cities you will not even have to pay long distance charges; you can use special data communications networks like Telenet, Tymnet and the Canadian Datapac network.

First, set your terminal program to operate at either 300 or 1200 Baud (depending on the modem you have), and also select either 7 bits with even parity or 8 bits with no parity, and one stop bit. (If one combination doesn't work, try another.)

Decide which network you should use. There is no surcharge for Telenet or Tymnet. Canadian residents using Datapac will be charged an additional \$10.80 (U.S.) per hour.

On Telenet: Uninet network has merged with Telenet. To get the Telenet number for your area, call (800) 336-0437. After you call the local access number and make connection, press ENTER twice. When the "TERMINAL=" prompt appears, press ENTER again. When the "@" prompt appears, type C DELPHI and press ENTER.

On Tymnet: Call (800) 336-0149 to get the Tymnet number for your area. After you dial your designated number and connect, you will see either "garbage" or a message saying "please type your terminal identifier." At this point, even if the screen is garbled, simply press 'A'. When "please log in:" appears, type DELPHI and press ENTER.

From Canada (on Datapac): Call Delphi Customer Service at (617) 491-3393 to get the Datapac number for your area. After you connect, press the period key (.) and ENTER (use two periods if you're using 1200 Baud). Type SET 2:1, 3:126 and press ENTER. Now type p 1 3106, DELPHI; and press ENTER. Delphi's new rates indicate an additional \$10.80 hourly surcharge for evening use of Datapac, which means a total of \$18 (U.S.) for connect time.

From other countries: Many countries have their own data networks that can connect to either Telenet or Tymnet. Check with the telephone authorities in your country for details on how to sign up for this service. When you have an account set up, you can reach Delphi with a "host code" of 3110 6170 3088 through Telenet, or 3106 90 6015 through Tymnet. (You'll have to pay the toll charges for this connection.)

Type in Your Username

If you're already a subscriber to THE RAINBOW, at the

"USERNAME:" prompt, type JOINDELPHI and press ENTER. At the "PASSWORD:" prompt, type RAINBOW. Then, at the "NUMBER:" prompt, type your individual subscription number from the mailing label of your latest issue of THE RAINBOW. (If there are one or more zeros at the beginning of this number, include them.)

If you don't already have a subscription, at the "USERNAME:" prompt, type JOINDELPHI and press ENTER. At the "PASSWORD:" prompt, type SENDRAINBOW and press ENTER. Have your MasterCard, VISA or American Express card ready, because you'll be led through a series of questions that will enable us to put your RAINBOW and Delphi subscriptions into effect. In an effort to hold down non-editorial costs, we do not bill for subscriptions.

If you make a typing error, just use Control-X and start over. Remember that at any point, when you're on Delphi, you can type HELP to get help on how to use the system. To get off the system just type BYE.

If you find that you're unable to log on to Delphi and enter the CoCo SIG after following these instructions, call us during afternoon business hours at (502) 228-4492. We'll be glad to offer assistance.

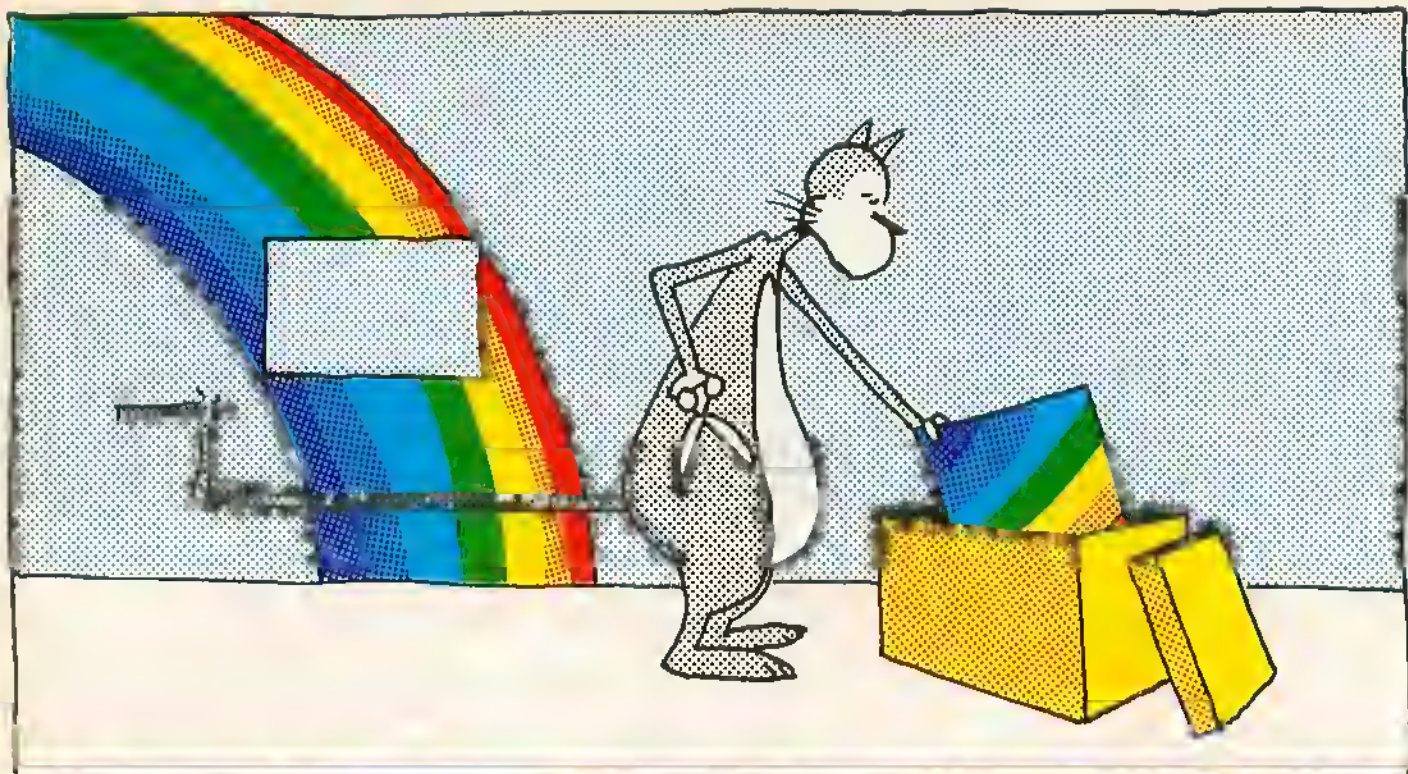
Come Visit Us! Type: GROUP COCO

After you sign in, you'll be prompted to set up your own, personal "user name" — Delphi is a friendly service, no numbers to remember — and you'll be asked a number of questions so Delphi can set up your account. You'll also be assigned a temporary password.

Delphi will tell you that your account will be ready after 6 p.m. the same day if you sign up before noon (Eastern time zone.) If not, your account will be ready at 6 p.m. the next day. Once an account is verified and opened, *each RAINBOW subscriber will be credited with an hour of free time!*

When you log back in, use your chosen username and your temporary password to access the system. At that point, you will meet Max, who will help you configure things and will change your temporary password into your own *personal* password. This is the password you will use for subsequent sessions — or until you change it.

After Max bids you goodbye, you'll wind up at the Delphi Main Menu; type in GROUP COCO and join us on the CoCo SIG!



HOW DO YOU GIVE A RAINBOW?

It's simple — Give a RAINBOW gift certificate . . .

Let a gift subscription to THE RAINBOW carry the premier Color Computer magazine right to your friends' doorsteps. THE RAINBOW is the information source for the Tandy Color Computer.

Each month, your friends will enjoy the intelligent programs, reviews and articles written exclusively for their CoCo.

First, your gift will be announced in a handsome card. Then, all year 'round, they'll remember you and your thoughtfulness when they get each edition of THE RAINBOW — more than 200 pages loaded with as many as 24 programs, 15 regular columns and lots of helpful hints and tips.

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Get your order to us by July 25 and we'll begin your friends' subscriptions with the September issue of RAINBOW.

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For credit card orders call (800) 847-0309, 8 a.m. to 5 p.m. EST.

All other inquiries call (502) 228-4492.

Subscriptions to THE RAINBOW are \$31 in the United States; U.S. \$38 in Canada. The surface rate to other countries is U.S. \$68; the air rate, U.S. \$103. Kentucky residents add 5% sales tax. U.S. currency only, please. All subscriptions begin with the current issue. Please allow 6 to 8 weeks for delivery. In order to hold down non-editorial costs, we do not bill.


```

78 IFA$="P"ANDLU>ØORA$="p"ANDLU>
ØTHENC$="Output to Printer":GOSU
B96:INPUT"What is your printer's
width";C:C=INT(C):IFC<1THEN79EL
SEGOSUB112:GOTO1Ø5
79 PLAYE$:GOTO59
8Ø NC=Ø:PS=S:FORQ=S TO S+(25Ø*LU
)-25ØSTEP25Ø
81 LN$="":FORQQ=Q TO Q+LL((Q-S)/
25Ø)-1:LN$=LN$+CHR$(LPEEK(QQ)):N
EXT:P=1:LC=Ø
82 IR=INSTR(P,LN$,T$):IFIR=ØTHEN
84
83 LC=LC+1:LT$=LEFT$(LN$,IR-1):R
T$=MID$(LN$,IR+LEN(T$),25Ø):IFLE
N(LT$)+LEN(R$)+LEN(RT$)>25ØTHENP
S=PS+25Ø:LC=Ø:GOTO87ELSELN$=LT$+
R$+RT$:P=IR+LEN(R$):GOTO82
84 LL((Q-S)/25Ø)=LEN(LN$):IFLEN(
LN$)=25ØTHEN86
85 LN$=LN$+STRING$(25Ø-LEN(LN$),
Ø)
86 FORZZ=1TO25Ø:LPOKEPS,ASC(MID$(
LN$,ZZ,1)):PS=PS+1:NEXT
87 NC=NC+LC:NEXT
88 PRINT"Number of occurrences c
hanged:"NC:GOSUB114:GOTO1Ø4
89 HSTATQ$,XQ,MX,MY:CP=1:GOSUB1Ø
8:PRINT"Line"LN"found.":LN$="":F
ORQQ=Q TO Q+LL((Q-S)/25Ø)-1:LN$=
LN$+CHR$(LPEEK(QQ)):NEXT:LOCATEØ
,3:ATTRØ,Ø:PRINTSTRING$(7,13):LO
CATEØ,3:PRINTLN$
9Ø LOCATEMX,MY:ATTRØ,4:PRINTSTRI
NG$(7,13):LOCATEMX,MY:LINEINPUT"
Target text: ";T$:LOCATEMX,MY:PR
INTSTRING$(7,13):LOCATEMX,MY:LIN
EINPUT"Replacement: ";R$:P=1
91 IR=INSTR(P,LN$,T$):IFIR=ØTHEN
93
92 LT$=LEFT$(LN$,IR-1):RT$=MID$(
LN$,IR+LEN(T$),25Ø):IFLEN(LT$)+L
EN(R$)+LEN(RT$)>25ØTHEN93ELSELN$
=LT$+R$+RT$:P=IR+LEN(R$):GOTO91
93 LL((Q-S)/25Ø)=LEN(LN$):IFLEN(
LN$)=25ØTHEN95
94 LN$=LN$+STRING$(25Ø-LEN(LN$),
Ø)

```

```

95 FORZZ=1TO25Ø:LPOKEQ,ASC(MID$(
LN$,ZZ,1)):Q=Q+1:NEXT:GOSUB114:G
OTO1Ø4
96 LOCATE(W-LEN(C$))/2,12:PRINTC
$:PRINT:RETURN
97 FORQ=S TO S+(25Ø*LU)-25ØSTEP2
5Ø
98 L$="":FORQQ=Q TO Q+LL((Q-S)/2
5Ø)-1:L$=L$+CHR$(LPEEK(QQ)):NEXT
:IFLEN(L$)=25ØTHEN99ELSEL$=L$+ST
RING$(25Ø-LL((Q-S)/25Ø),Ø)
99 IR=INSTR(1,L$,T$):IFIR=ØTHEN1
Ø3
1ØØ ATTRØ,Ø:LOCATEØ,3:PRINTSTRIN
G$(7,13):LOCATEØ,3:PRINTL$:ATTRØ
,4:LOCATE(W-3Ø)/2,22:PRINT"Do yo
u want to continue? (Y/N)";
1Ø1 A$=INKEY$:IFA$=""THEN1Ø1ELSE
IFA$="Y"ORA$="Y"THEN1Ø3
1Ø2 ED=1:EL=LL((Q-S)/249):PT=Q:G
OTO1Ø4
1Ø3 NEXT:ATTRØ,Ø:GOTO16
1Ø4 POKE&HFFD9,Ø:CLOSE#-1:GOSUB1
47:CLS1:ATTRØ,Ø:LP=1:X=Ø:Y=3:WID
THW:GOSUB54:LOCATEX,Y:PRINTL$:GO
TO18
1Ø5 LOCATEØ,11:ATTRØ,Ø:PRINTSTRI
NG$(12,13):GOTO18
1Ø6 INPUT"start, increment";SR,I

```

```

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```

C:SR=INT(SR):IC=INT(IC)
107 IFSR+IC*L>63999THENPLAYE$:GO
TO106ELSE16
108 NB$="":INPUT"What is the lin
e number";LN=INT(LN):LN$=STR$(
LN):LN$=RIGHT$(LN$,LEN(LN$)-1)+
" "
109 FORQ=S TO S+(250*LU)STEP250:
FORQQ=Q TO Q+LEN(LN$)-1:NB$=NB$+
CHR$(LPEEK(Q)):NEXT:IFLN$=NB$ T
HEN111ELSENB$="":NEXT
110 ED=0:CP=0:PRINT"Line"LN"does
not exist.":GOSUB114:GOTO105
111 IFCP=1THENCN=0:RETURNELSEED=
1:LX=(Q-S)/249:EL=LL(LX):PRINT"L
ine"LN"found.":PT=Q:L$="":FORQQ=
Q TO Q+249:L$=L$+CHR$(LPEEK(Q))
:NEXT:GOTO104
112 POKE&HFFD8,0:PRINT#-2:FORQ=S
TO PT-1:IFLPEEK(Q)=0THEN113ELSE
PRINT#-2,CHR$(LPEEK(Q)):IFPOS(-
2)=C THENPRINT#-2
113 NEXT:POKE&HFFD9,0:RETURN
114 LOCATE(W-26)/2,22:PRINT"Pres
s any key to continue.";
115 IFINKEY$=""THEN115ELSERETURN
116 LOCATE(W-20)/2,22:PRINT"Are
you sure? (Y/N)";
117 IFINKEY$="Y"ORINKEY$="y"THEN
RETURNELSEIFINKEY$="N"ORINKEY$="
n"THEN105ELSE117
118 LINEINPUT"What is the filena
me? ";F$:POKE&HFFD8,0:F$=LEFT$(F
$,8):IFDV=1THENF$=F$+".BAS"
119 OPEN"O",#DV,F$:ATTR0,0:WIDTH
W:PRINT"File being saved: "F$:FO
RQ=S TO S+(250*LU)-250STEP250:LN
$="":FORQQ=Q TO Q+LL((Q-S)/250):
LN$=LN$+CHR$(LPEEK(Q)):NEXT:PRI
NTLN$;PRINT#DV,LN$:NEXT:GOSUB14
7:CLOSE#-1:POKE&HFFD9,0:RETURN
120 LINEINPUT"What is the filena
me? ";F$:POKE&HFFD8,0:F$=LEFT$(F
$,8):IFDV=1THENF$=F$+".BAS"
121 FORQ=0 TO LU:LL(Q)=0:NEXT:PT=
S:OPEN"I",#DV,F$:ATTR0,0:WIDTHW:
PRINT"File loading: ";F$
122 POKE&HFFD8,0:IFEOF(DV)=-1THE
N127ELSELINEINPUT#DV,LN$:POKE&H
FD9,0
123 IFLN$=""THEN122
124 LN$=LN$+CHR$(13):LL(XX)=LEN(
LN$):IFLEN(LN$)=250THEN125ELSELN
$=LN$+STRING$(250-LEN(LN$),0)
125 PRINTLN$;FORQ=1TO250:LPOKEP
T,ASC(MID$(LN$,Q,1)):PT=PT+1:NEX
T
126 XX=XX+1:IFXX<L THENGOTO122EL
SEXX=XX-1:GOTO127
127 LU=XX:POKE&HFFD9,0:EL=LL(XX)
:RETURN
128 ATTR0,0:WIDTHW:ATTR0,0,U:PRI

```

```

NT:PRINT:LOCATE(W-11)/2,1:PRINT"
Cut & Paste":ATTR0,0:PL=1:X=0:Y=
3:LOCATEX,Y:PRINTLN$:ST=1:EN=EE:
LOCATE(W-30)/2,12:PRINT"Position
"PL"Start"ST"End"EN
129 EXEC44539:A$=INKEY$
130 IFA$=CHR$(8)THENPL=PL-1:IFPL
<1THENPL=1:PLAYE$:GOTO129ELSEX=X
-1:IFX<0THENX=W-1:Y=Y-1:GOTO142E
LSE142
131 IFA$=CHR$(9)THENPL=PL+1:IFPL
>EE THENPL=EE:PLAYE$:GOTO129ELSE
IFPL=251THENPL=250:PLAYE$:GOTO12
9ELSEX=X+1:IFX>W-1 THENX=0:Y=Y+1
:GOTO142ELSE142
132 IFA$=CHR$(10)THENPL=PL+W:IFP
L>EE THENPL=PL-W:PLAYE$:GOTO129E
LSEIFPL=251THENPL=250:PLAYE$:GOT
O129ELSEY=Y+1:IFY>24THENY=24:GOT
O142ELSE142
133 IFA$=CHR$(94)THENPL=PL-W:IFP
L<0THENPL=PL+W:PLAYE$:GOTO129ELS
EY=Y-1:IFY<0THENY=0:GOTO142ELSE1
42
134 IFA$="S"ANDPL<EN ORA$="s"AND
PL<EN THENPLAY"L25O3C":ST=PL
135 IFA$="E"ANDPL>ST ORA$="e"AND
PL>ST THENPLAY"L25O3C":EN=PL
136 IFA$="M"ANDPL>=EN ORA$="M"AN
DPL<ST ORA$="m"ANDPL>=EN ORA$="m
"ANDPL<ST THEN138
137 GOTO129
138 PLAY"L25O3C":MV$=MID$(LN$,ST
,EN-ST+1):IFPL>=EN THENLT$=LEFT$(
LN$,ST-1):MD$=MID$(LN$,EN+1,PL-
EN):RT$=MID$(LN$,PL+1,EE-EN):CL$
=LT$+MD$+MV$+RT$ ELSELT$=LEFT$(L
N$,PL):MD$=MID$(LN$,PL+1,ST-PL-1
):RT$=MID$(LN$,EN+1,EE-EN):CL$=L
T$+MV$+MD$+RT$
139 LOCATE0,3:PRINTCL$:LOCATE0,1
2:PRINT:LOCATE(W-14)/2,12:PRINT"
Like so? (Y/N)":EXEC44539:A$=INK
EY$:IFA$="Y"ORA$="y"THENLN$=CL$
ELSEA$="":LOCATE0,12:PRINT:LOCAT
E0,3:PRINTLN$:GOTO142
140 LN$=LN$+CHR$(13):IFLEN(LN$)=
250THEN141ELSELN$=LN$+STRING$(25
0-EE,0):LN$=LEFT$(LN$,250)
141 AZ=Q:FORQQ=1TO250:LPOKEAZ,AS
C(MID$(LN$,QQ,1)):AZ=AZ+1:NEXT:G
OTO104
142 LOCATE(W-30)/2,12:PRINT"Posi
tion"PL"Start"ST"End"EN:LOCATEX,
Y:PLAYP$:IFPEEK(343)=247THEN130
143 IFPEEK(344)=247THEN131
144 IFPEEK(342)=247THEN132
145 IFPEEK(341)=247THEN133
146 GOTO129
147 IFPEEK(188)=14THENCLOSE#1:RE
TURNELSERETURN

```




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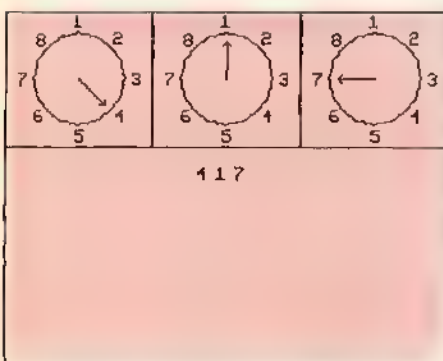
**Contest
Announcement**

*Brush up your programming creativity
and show us the result!*

Set Your Wheels to Spinning

By Bill Bernico

Everybody likes contests. Everybody likes prizes. Come to think of it, everybody likes a good challenge, too. Here's something that has all three. It's a programming contest where you, the readers, get a chance to finish a BASIC program I've started. There is no right or wrong way to complete my "core program." Each contestant may have a different idea of what this program should eventually do. Maybe your idea will win you a prize, so give it a try!



So far, here's what the program does. Three squares appear on the Hi-Res graphics screen. Each of those squares

Bill Bernico is the author of over 200 Color Computer programs and is a frequent RAINBOW contributor whose hobbies include golf, writing music and programming. Bill is a drummer in a rock band and lives in Sheboygan, Wisconsin.

has a dial within it, numbered from one to eight. As you run the program, the pointer on the first dial starts spinning. To stop that first dial on a random number, press 1. Once you do, the first digit of a three-digit number appears and Dial 2 starts spinning. To stop that dial on a random number, press 2; the second digit will appear below. Last, the third dial begins spinning. Press 3 to stop it, and the third digit of that three-digit number is displayed. The screen holds in this position until you press the space bar, starting the procedure all over again.

That's all there is to it. Run it a few times and picture in your mind what you think the finished program should do. Maybe you have a Simulation in mind. Maybe you see it as some sort of utility. Or perhaps your finished program will be an educational learning tool, or even a game of chance. Submit anything. What you might think is not so great, I might feel is a winner.

Contest Rules

1. Programming is restricted to BASIC, including pokes or anything that can be typed in directly from the keyboard without help from other programs.

2. All entries must be submitted on either tape or disk. Include several saves and a brief explanation of how your entry works and what it does.

3. All entries must be based on the

"core" provided here. That is, I want to at least see three spinning dials in the finished program. From there you're on your own.

4. Contest deadline is October 1, 1988, so get your entries in before then. The winning program will be published in a future issue of THE RAINBOW.

5. All entries become the property of Falsoft, Inc., publisher of THE RAINBOW.

Contest Prizes

First prize is a year's subscription (or extension) to THE RAINBOW and a year's subscription (or extension) to either RAINBOW ON TAPE or RAINBOW ON DISK.

Second prize is a year's subscription to THE RAINBOW.

Third prize is *Special Pack*, a collection of approximately 150 of my best programs.

Fourth through 10th prize winners will receive a package containing 25 of my best programs.

I'll be judging *all* entries, looking for that special talent from someone who may want to eventually co-author future programs with me. It could really be fun, so get your entries in now. Send all entries to:

THE RAINBOW Programming Contest
The Falsoft Building
9509 U.S. Hwy. 42
P.O. Box 385
Prospect, KY 40059



The listing: CONTEST

```

10 'BASIC PROGRAMMING CONTEST
20 'by Bill Bernico
30 'AND (YOUR NAME HERE)
40 '
50 CLEAR1000: DIM A(12,12)
60 D$="BM=H; ,=V; ": X$="BM=X; ,=Y;
70 N1$="BR3R2U6NGD6R2": N2$="BR3BU5ER2F
DGNLFDGL2NH": N4$="BR6U6G3R4": N5$
="BR3BUFR2EU2HL3U2R4": N6$="BR3BU
3R3FDGL2HU4ER2": N7$="BR3BU6R4DG3
D2": N8$="BR4HUER2EUHL2GDFR2FDGNL
2"
80 PMODE4,1: PCLS1: SCREEN1,1: COLO
R0,1
90 DRAW"BM8,0R80D73L80U73"
100 CIRCLE(48,36),25
110 DRAW"BM42,8"+N1$+"BM64,17"+N
2$+"BM74,39"+N3$+"BM65,59"+N4$+"
BM43,70"+N5$+"BM21,59"+N6$+"BM12
,39"+N7$+"BM22,18"+N8$
120 GET(8,0)-(88,73),A
130 PUT(88,0)-(168,73),A: PUT(168
,0)-(248,73),A
140 DRAW"BM8,0R240D191L240U191
150 RI$=D$+"R20NH2G2": LE$=D$+"L2
0NE2F2": UP$=D$+"U20NG2F2": DO$=D$
+"D20NH2F2": LL$=D$+"L20NL203": LL
$=D$+"F14NU3L3": LL$=D$+"G14NR3U3

```

```

": UL$=D$+"H14NR3D3
160 H=48: V=36: GOSUB 270
170 IF INKEY$<>"1" THEN 160
180 X=110: Y=90: GOSUB 360
190 H=128: V=36: GOSUB 270
200 IF INKEY$<>"2" THEN 190
210 X=120: Y=90: GOSUB 360
220 H=208: V=36: GOSUB 270
230 IF INKEY$<>"3" THEN 220
240 X=130: Y=90: GOSUB 360
250 IF INKEY$<>"CHR$(32)" THEN 250
260 GOTO 80
270 DRAW"C0"+RI$+"C1"+RI$
280 DRAW"C0"+LR$+"C1"+LR$
290 DRAW"C0"+DO$+"C1"+DO$
300 DRAW"C0"+LL$+"C1"+LL$
310 DRAW"C0"+LE$+"C1"+LE$
320 DRAW"C0"+UL$+"C1"+UL$
330 DRAW"C0"+UP$+"C1"+UP$
340 DRAW"C0"+UR$+"C1"+UR$
350 RETURN
360 S=RND(8): ON S GOSUB 370,380,3
90,400,410,420,430,440: RETURN
370 DRAW"C0"+RI$+X$+N3$: RETURN
380 DRAW"C0"+DO$+X$+N5$: RETURN
390 DRAW"C0"+LE$+X$+N7$: RETURN
400 DRAW"C0"+UP$+X$+N1$: RETURN
410 DRAW"C0"+UR$+X$+N2$: RETURN
420 DRAW"C0"+LR$+X$+N4$: RETURN
430 DRAW"C0"+LL$+X$+N6$: RETURN
440 DRAW"C0"+UL$+X$+N8$: RETURN

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A tutorial on creating CoCo comics, and the announcement of an ongoing cartoon-drawing contest



Cartoons are drawings that depict everyday situations in a comical manner. They express ideas, inform us on current events, teach lessons and, most importantly, they entertain.

Everyone can identify with cartoons. They are a twist on everyday life. You see them taped to desks, stuck on

Logan Ward has been a CoCo nut since 1982 and enjoys creating all types of graphics on his Color Computer. His interests include baseball card collecting and following Nascar races. Logan creates the Maxwell Mouse and CoCo Cat cartoons for THE RAINBOW and is president of the Memphis Color Computer Users Group.

refrigerators and pinned to bulletin boards. Cartoons are usually the first things people look for upon opening the paper or browsing through a magazine.

Some of the earliest cartoons date back to the mid-1700s. These cartoons depicted oppression and taxes, which were the main issues of the time. Ben Franklin and Paul Revere drew cartoons urging the colonists to revolt against England. But it wasn't until the mid-1800s that cartoons became a staple in magazines and newspapers.

Political cartoons did not become popular until the late 1800s. By the early 1900s, however, cartoons were a firmly entrenched piece of Americana.

Through the years, cartoons have been produced using a variety of tools.

Pens, ink, pencils, erasers, charcoal, paint, rulers and drawing boards have been employed by cartoonists in creating their work. But now, with the advent of the personal computer, anyone can create cartoons digitally. Modern cartoon artists can now use a computer, mouse and printer as their tools.

Five Types of Funnies

Cartoons can be categorized into five general types; all varieties are distinctive, and each conveys a different type of story. First of all and probably most important is the comic strip, which appears mainly in newspapers and magazines. This type of cartoon is usually a standard feature, and you'll likely find several strips on one or more



pages of a newspaper. These comic strips, such as "Peanuts" and "Blondie," contain a series of panels linked together to tell a story or achieve a humorous climax.

Another popular form of cartooning is called the gag cartoon. This consists of a single panel with a clever one-line caption. The gag cartoon is usually an instant transfer of humor. It can feature a continuing character or be diverse, showing different characters each time (think of Gary Larson's "The Far Side"). Gag cartoons poke fun at everyday life and create humorous situations out of everyday occurrences. This is a type of cartoon popular with magazines.

Editorial cartoons are another favorite brand of cartooning. Like the gag variety, the editorial cartoon is a single-panel cartoon that covers a multitude of subjects. However, it is a pictorial opinion conveyed by the artist to sway the reader's judgment. Editorial cartoons deal with current events or social issues and make fun of people in the spotlight.

Another visually humorous type of cartoon is the animated cartoon. This type of cartoon takes the longest time to create but is usually the most pleasing. Each animated cartoon starts as a sketch, which is later turned into a completed drawing and then painted. More drawings are made similar to the first, with the exception of a small change in placement of a hand, eye or other body part.

After several drawings are made, they are quickly shown in sequential order, taking on the illusion of movement. Background scenes are added later to complete the work. Animated cartoons can take from a couple of minutes to a couple of hours to tell their stories. Subject matter for this style of cartooning is very broad; material can range from the informative, such as safety guides for workers, to the humorous, showing Bugs Bunny making a fool of Daffy Duck.

Finally, there's illustrative cartooning. This type is found in advertisements, school books, promotional materials, etc. Most illustrative cartoons draw attention to or help tell the story of the idea they are promoting. Sometimes illustrative cartoons use famous comic strip and gag characters. For example, Garfield is currently used to promote libraries.

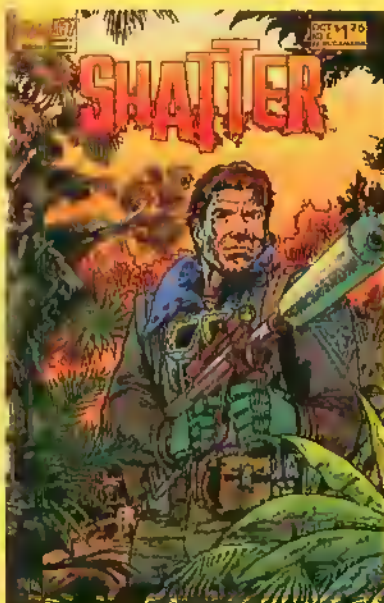
Coming Up with Ideas

Consistently developing good ideas is

Attention, Cartoonists!

As you skim through the magazine each month, you've probably noticed "Mouse Tales," starring Maxwell Mouse. Logan Ward is the cartoonist responsible for Maxwell Mouse, and he sends us the cartoon every month in living color — thanks to his CGP-220. Starting with this issue, Logan will be responsible for bringing CoCo Cat back to the pages of THE RAINBOW.

We here at THE RAINBOW are pretty excited about the new graphics programs and their capabilities! Just imagine — with a little creativity, a printer and graphics programs that rival (and beat) the "big boys," CoCoists can unleash their creative potential! With word processing and desktop publishing programs, CoCoists routinely publish their own newsletters. Now with the enhanced graphics that programs like *Color Max Deluxe* and *CoCo Max III* allow, not only are cartoons like Logan's possible, but so are whole comic books! Add the implications of video digitizers, sound digitizers (like Gimmesoft's *Maxsound*) and laser printers, and the possibilities are mind-blowing!



SHATTER, from First Comics Inc.TM, is drawn on the Macintosh.

Did you know that there are already commercial comic books drawn on computer? The computer is the Macintosh, not the CoCo, unfortunately, but we know anything a Mac can do. . . . SHATTER, from First Comics, Inc.TM, was probably the first comic drawn on computer. It's a science fiction portrayal of the world a few decades into the future, when the globe is divided into corporate, not political, states; having been enhanced with RNA transplants, animals are able to take over human tasks. The drawing's digitized look and the "computer" fonts used for dialogue and narration all contribute to the futuristic atmosphere. Even Marvel Comics is "going computer" with its *Iron Man* graphic novel.

What does this mean for CoCoists? Take a look at the pictures that fill the pages of "CoCo Gallery" — the quality of our graphics just screams for the CoCo to get into the act. Our machine can hold its own!

We are so enthused about what the CoCo can do, in fact, that we are planning an ongoing cartooning contest, something like the "CoCo Gallery." If you've had an idea for a CoCo cartoon gnawing at you, put it onscreen, print it out (you don't have to use a color printer) and send it in. If we like it, we'll publish it and pay you for your creative talents.

For a guide on what we're generally looking for, examine Logan's cartoons and follow the advice he gives in this article. But be creative — we're breaking new ground here! If you like to draw cartoons by hand and your subject is Color Computer related, we're interested in your work, too (check out Kelly Taylor's "Dr. Nibble" on Pages 116 and 120, this issue).

The best thing about this contest is that there is no deadline, and there's no limit to the number of cartoons you can submit. Just tell us what graphics program you used to create your cartoon and send us a printout and a disk copy of your cartoon panels. Include your name, address and phone number, and help us take CoCo applications to exciting new heights!

probably the hardest part of being a cartoonist. Whether you create cartoons on a daily basis or draw only one a month, you must be on the lookout for fresh ideas and new roads to travel. A cartoonist must have the ability to picture an entire cartoon in his mind and then transfer it to the computer or paper.

Cartoonists get their material in a variety of ways. Some observe gestures,

others listen. Some lock themselves in their rooms, while others stare into space. Do not try to force ideas — let them come to you. Even a simple sound can trigger a great idea.

My ideas come when I'm not even thinking about cartoons. I can be washing the car or cutting the grass when I am struck with a good idea. However, my best ideas come right before I fall asleep, when I am kind of in the twilight

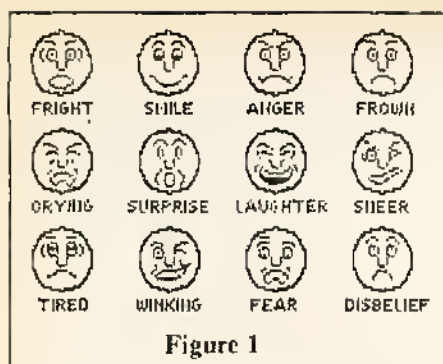


Figure 1

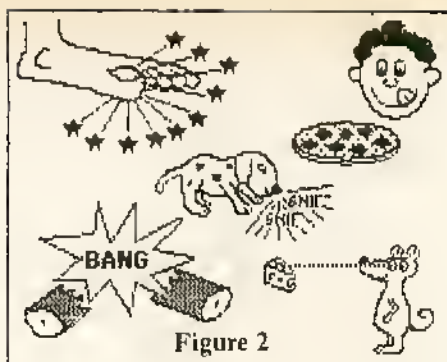


Figure 2

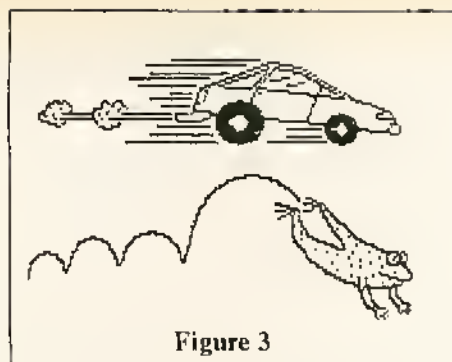


Figure 3

zone. I keep a note pad by my bed to write them down. If I don't record them when they are conceived, my ideas are forgotten by morning. Use whatever works for you to get ideas, but *do* write them down. It can be surprising what you'll find on a look back through your notebook.

What You'll Need

In order to create cartoons on your CoCo, you need several tools. First, of course, you need a CoCo with TV or monitor — any model will do fine. Second, you need a mouse. I do *not* recommend joysticks, as they lack the precision necessary to create detail in pictures and cartoons.

Most importantly, you need a good graphics editor. I recommend using *CoCo Max II*, *CoCo Max III* or *Color Max Deluxe*. These packages have the features needed to draw and manipulate cartoons on a CoCo (like flip, rotate, cut and paste). Lastly, you need a printer; however, this can be optional — but always nice to have if you want a hard copy to show friends. If you can find one, I suggest getting a CGP-220. It does a good job on a CoCo 1 or 2 and an unbelievable, eye-popping job on the CoCo 3. A cartoon printed out with this color printer looks like it belongs in the Sunday comics. If you have a CGP-220 and would like to use it with graphics drawing programs that don't support it, see the May '88 RAINBOW: Page 42, for Duane M. Perkins' *CoCo 3 Color Dump*, and Page 58, for Tracy L. Skaggs' *PMode Polychrome* for CoCos 1 and 2. These programs dump CoCo graphics screens in color.

Tricks of the Trade

As with anything in life, you must be original to be successful. This holds true in cartooning. Developing original techniques and ideas is the key to being a popular cartoonist. Try not to copy or mimic someone's technique. Whether your style is serious or sarcastic, do what feels good to you. There is always

an audience, and you will be a success.

In cartooning, things tend to be a little exaggerated. Large eyes, elongated noses, four fingers, swollen heads, silly hairstyles and big feet all seem to be the norm. The nicest aspect of cartooning is the freedom to draw anything in any way possible. There are no boundaries, and the ideas are limited only by your own imagination.

Facial expressions play an important role in how a drawing is interpreted. Almost any type of mood or feeling can be illustrated by the expression of the character's face (see Figure 1). A slight slant of the eyebrows can mean the difference between a frown and a sneer. A change in the curvature of the mouth can turn a somber expression into a cheery grin.

Conveying the senses plays a huge part in the creation of a cartoon. Smell, sound, taste, sight and touch can all be illustrated in cartooning (see Figure 2). Used properly, the senses can express your ideas better than words and add depth to your cartooning abilities.

Getting a character into the proper pose can be critical to your cartoon. For example, if your main character is talking to a support character, show him in front with the support character's back turned. This way everyone spots the center of attention, and your gag goes over immediately.

It is always best to envision your character's positions in your mind in order to create the appropriate setting. Try to think of the scene in terms of "camera angles," where you want the star to be the center of attention. Some scenes require close-ups; others take wide-angle shots. Some are action shots that require movement (see Figure 3). Remember, you are the producer and your computer is the camera. It is up to you to develop the perfect scene.

Getting the proper perspective goes hand-in-hand with posing. In real life, objects that are far away seem smaller than objects that are closer to us (see Figure 4). This holds true in cartooning,

also. If your character is walking toward a door, for example, then naturally the door must be taller than the character. Creating the right depth greatly enhances the cartoon's attraction to the reader.

Creating a CoCo Cartoon

Once you have your cartoon clearly thought out, it's time to boot up your favorite graphics program and get to work. First, draw a box on the screen — this is what your cartoon will be drawn in. There are approximately 80 pixels per inch horizontally and 74 pixels per inch vertically in the regular print mode of *CoCo Max*. It is up to you to determine the size. I use a 254-by-182 pixel box to create my drawings. I recommend making the box only one line thick to draw no attention to it. Now save your box to a separate file so that you can use it for future cartoons.

After your box is complete, it's time to start drawing the cartoon. It is best to create your characters first. For the time being, keep all your sketches in black-and-white. I recommend using a one-pixel black paint brush. This works better than using the pencil icon because the pencil sometimes gets in the way of seeing where you want to draw, and it can also erase part of your drawing if you let off your mouse button and then click it again.

At this stage, it is best just to get a rough outline of your character. Draw several different variations and choose the one you like most. Once you have picked the pose you want to use, erase the others. Use Zoom or Fat Bits to clean up the picture and smooth out rough areas. It is easiest to do facial expressions and hand movements under Fat Bits.

As when drawing anything on the CoCo, it is best to make saves before you do a lot of editing. If you do something you don't like, you can always reload the drawing from an earlier stage.

When you are drawing front views of

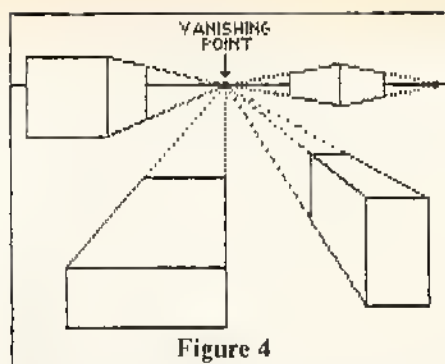


Figure 4

your character, you might find it easier to draw only half of the character and then use the editing box to make a copy. Use the Horizontal Flip feature on the copy to make a mirror image of it. Click out of the editing box, lasso the flipped copy and join it side-by-side to the original — you now have a complete character by doing half the work. This technique can be used for any symmetrical shape.

Once you finish drawing your character, use a formatted disk to save character clips. As you go along, save each pose of every character to your clip disk. Use the lasso icon to copy your characters. This way you can recall characters at any time and manipulate them for use in another scene.

When your collection of characters has grown large, take several formatted disks and make clip disks of hands, arms, bodies, legs, feet and heads. These can be copied from your character clip disk. You will then have the ability to mix and match body parts to create new characters — just like Dr. Frankenstein.

After your characters have been drawn, it's time to draw the background. First, draw the horizon. Use the rubber band line function to do this. If this line intersects your character, go ahead and let it go through the character. This will keep the horizon level on both sides of the pose. Remember, you can always paste the character back to the screen from the clip disk if you have to draw through it to create background objects.

Make your background relate to your gag. Keep background objects from interfering with your characters, and make sure the scene is proportional. When you are drawing buildings and houses, it is best to use rectangles and rubber band lines. Trees can be sketched with a single-pixel paintbrush, using jagged lines for branches. Clouds can be drawn with a one-pixel brush; they can also be created with a larger round brush, then circled with the Edit box using the Trace Edges function.

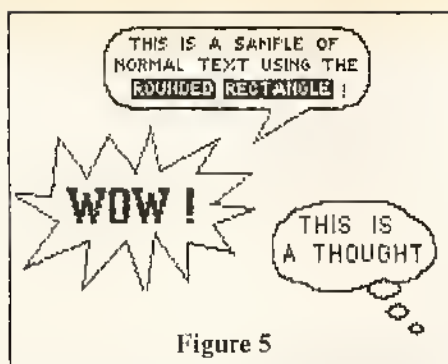


Figure 5

If you want to draw the sun, moon or planets, use the circle icon. A crescent moon can be drawn using two circles spaced 15 to 25 pixels apart, with the center point staying on the same horizon line. Erase unwanted curves once you have your circles in place. Stars are drawn using the one-pixel paintbrush.

Consecutive patterns like bricks, shingles or floor patterns can be created easily by using the Edit Pattern func-

"Developing original techniques and ideas is the key to being a popular cartoonist."

tion. Be sure to make these patterns simple so they won't distract from your character and gag. As with drawing characters, you can create symmetrical objects by drawing only half of an object, then copying and flipping it to match the other side. As always, use the Zoom function to clean up background objects and get a clear, crisp scene.

Although some cartoon gags can be expressed without words, most require some type of dialogue. When you are adding text to your cartoon, it is best to create a balloon or dialogue box outside the cartoon itself and then incorporate it later.

To create your balloon, you must first decide what text font you want to use. I recommend using a small font for normal text situations. If you want to emphasize a particular word, use a bold or shadow style on it. For one-word expressions like "Boing," "BANG!" or "Wow," use a large text font with any style you prefer. Bring in the lasso to manipulate and center the text. After

you have positioned the text, put the balloon border around it. There are several ways to accomplish this: You can use the one-pixel paintbrush and draw a circle around the text, *cleaning* it up with Fat Bits; you can use a rounded rectangle to place a border around the text; or you can use a rubber band line to express text in a dynamic manner (see Figure 5).

Once the border is the way you want it, circle it with the lasso and cut it out. Position the cartoon in the window and paste the text balloon back onto the cartoon. At this point, you can position the balloon anywhere you want. Click to make your selection permanent. Next you must direct the text to the character that is speaking. Use the one-line brush or rubber band line to make the cone point to your character. Use Fat Bits to clean up. If a character is thinking instead of speaking, simply draw small circles going from the character to the balloon.

At this point, if you are doing a gag cartoon, you are finished. If you are doing a strip, repeat the process for every panel.

When you're finished with your cartoon, you will want to print it out. If you are using a dot matrix printer, I recommend using double-strike if possible: This will give your printed cartoon that professional look. You can print in any size you like, but the smaller the print-out, the more detailed the drawing looks.

If you are fortunate enough to have a CGP-220, you can print out a color version of your cartoon. In my opinion, this is the only way to print cartoons. Personally, I prefer to create my cartoons on my CoCo 2 in black-and-white and then transfer them to the CoCo 3 for coloring. This way, I have the cartoon available on both Color Computers, which gives me the ability to print it out in any style using any printer.

CoCo cartooning is an entertaining and creative aspect of graphics application on the Color Computer. No particular style is required, and any CoCo user can get involved with this newest aspect of computer graphics. All it takes is a little imagination and original thought to produce wonderful cartoons just like the pros.

(Questions or comments regarding this tutorial may be directed to the author at 2774 Lakeside Drive, Memphis, TN 38134. Please enclose an SASE when writing for a reply.) ☺



This month's article presents one example of the many verbal math problems that middle and upper division school children study. Verbal problems contain a short written story that the student must interpret before the math computation can be done. Verbal problems come in many types: Motion, interest and measurement problems are just a few. This month's program concerns computing the cost of various amounts of three grades of gasoline.

This topic can lead to learning in subject areas other than math. Students in social studies, for example, may be interested in tracing the cost of gasoline over the past 15 years. The oil crisis of the '70s made the public acutely aware for the first time of its vulnerability to the price of this commodity. I can vividly remember the high prices and especially the long lines at gas stations in those times. Children might enjoy learning about the reasons for the gas crisis and the likelihood of its return.

Almost every student has access to and is familiar with the family car. Several science lessons can be given on the topic of what makes the cars go. An explanation of gasoline grades — regular, premium, leaded and unleaded — should be given to the student before beginning this program, although I often find that many children know as much as adults do about types and brands of cars and gasolines.

Our program has an illustration of three gas pumps, which contain regular, no-lead and premium gas, respectively. A price for each appears under each pump. The prices appear randomly from example to example, always in ascending order with the premium gas priced highest. These prices, while not always totally realistic, tend to offer a fairly wide variety in practicing the particular math computation needed to solve these problems.

The prices will always be in integers such as \$1.24. To put this program on a level for older students, you may readjust the gas prices to fractional or decimal values as they usually occur in reality. In this case, be sure to tell the

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

Practice in solving verbal math problems

Motor Math

By Steve Blyn
Rainbow Contributing Editor

students to round off to the nearest whole cent.

The student is asked to compute the price of a certain number of gallons of one of the three types of gasoline. The student must be careful to read the question and select the type of gasoline that the question refers to. This is a skill in and of itself — carefully reading the

question and deciding just what is being asked for. Too often, students will assume that they can predict the next question and fail to read it carefully.

Lines 50 through 120 draw the three gas pumps. Lines 140 through 190 choose the three current prices. Line 190 ensures that the price of regular gas is at least \$1, with the other two prices always somewhat higher. Line 210 selects the number of gallons currently purchased, represented by variable Q. Line 220 selects the type of gas currently purchased, represented by variable R. The true price is therefore Q times either A, B or C, depending on whether variable R chooses 1, 2 or 3.

Lines 260 through 290 ask for and evaluate the student's answer. The student is informed whether the answer was correct. If incorrect, the correct answer is displayed. When the ENTER key is pressed, the next example is displayed. After 10 examples, the student receives a scorecard. The student may then press B to begin again or E to end the program.

As always, we at Computer Island hope that your child or students enjoy and learn from this program. □

The listing: GASQUIZ

```
10 REM"BUYING GASOLINE"
20 REM"STEVE BLYN, COMPUTER ISLAND, STATEN ISLAND, NY, 1988"
30 CLS
40 REM"DRAW THE THREE GAS PUMPS"
50 PRINT@35,"REG.":PRINT@44," N
O ":PRINT@53,"PREM";
60 PRINT@67,"----":PRINT@76,"LE
AD":PRINT@85,"----";
70 FOR X=6 TO 13:FOR Y=6 TO 14:S
ET(X,Y,4):NEXT Y,X
80 FOR X=24 TO 31:FOR Y=6 TO 14:
SET(X,Y,3):NEXT Y,X
90 FOR X=42 TO 49:FOR Y=6 TO 14:
SET(X,Y,2):NEXT Y,X
100 FOR Y=4 TO 12:SET(14,Y,5):SE
T(32,Y,5):SET(50,Y,5):NEXT Y
110 SET(15,13,5):SET(33,13,5):SE
T(51,13,5)
120 FOR T=1344 TO 1535:POKET,143
:NEXT T
130 REM"CHOOSE THE CURRENT PRICE
$"
```



```

140 J=J+1
150 A=RND(100)+50:B=A+RND(20):C=
B+RND(20)
160 A=A/100:B=B/100:C=C/100
170 PRINT@320,"":PRINT@352,"":PR
INT@416,"":PRINT@448,""
180 IF J>10 THEN 340
190 IF A<1 THEN 150
200 PRINT@259,USING"#.##";A;:PRI
NT@268,USING"#.##";B;:PRINT@277,
USING"#.##";C;
210 Q=RND(7)+2:REM"THE # OF GALL
ONS"
220 R=RND(3):IF R=1 THEN N=A:A$=
"REGULAR"
230 IF R=2 THEN N=B:A$="NO LEAD"
240 IF R=3 THEN N=C:A$="PREMIUM"
250 AN=N*Q
260 PRINT@320,"WHAT IS THE PRICE
OF"Q"GALLONS OF "A$" GAS TODAY
? $";
270 LINEINPUT W$:W=VAL(W$)
280 IF INT(W*100+.05)=INT(AN*100
+.05) THEN PRINT@426,"CORRECT":R
R=RR+1:PLAY"A":GOTO 300
290 PRINT@418,"SORRY,THE ANSWER
IS $";AN
300 PRINT@453,"PRESS ENTER TO GO
ON";
310 EN$=INKEY$
320 IF EN$=CHR$(13) THEN 130 ELS
E 310
330 GOTO 330
340 PRINT@326,"THIS SET IS OVER.
"
350 PRINT@357,"YOUR SCORE WAS"RR
*10;"%"
360 PRINT@448,"PRESS 'B' TO BEGI
N OR 'E' TO END";
370 EN$=INKEY$
380 IF EN$="B" THEN RUN ELSE IF
EN$="E" THEN CLS:END
390 GOTO 370

```

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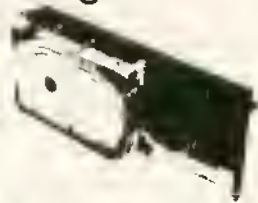
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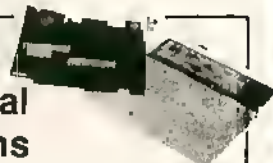
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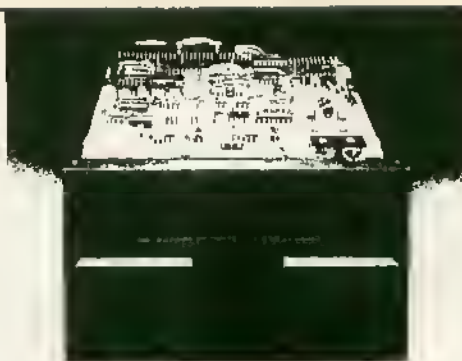
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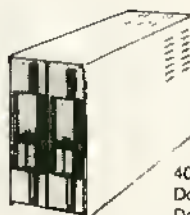
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*An action-packed arcade game written
in machine language*

Escape From Tut's Tomb

By Chris McKernan



You were warned, but did you listen? No. And now you're lost in this musty tomb, fighting for your life against smelly, stupid horror movie rejects that don't have sense enough to stay dead when you shoot them.

Times like these, you have to ask yourself — is the archeological find of the century (not to mention treasure beyond avarice's most decadent fantasy) worth all this? Of course — that's what keeps you crawling into caves. And if not for the scientific recognition and the treasure (but mostly the treasure), then for the *adventure!*

Speaking of adventure, you might be a little over

Chris McKernan is an electronics technician for Paramax Electronics. His hobbies include computers, photography and music.

your head in it this time. Crawling into *this* hole in the ground got you lost in these dark catacombs. Realizing that you have stumbled across the elusive tomb of King Tut is little comfort, at least not as long as those uglies keep trying to kill you. Your feeble musket fire is just barely able to hold them off. Every time you manage to grab some treasure and escape from one room into what must surely be a safe place to stop, relax and count your riches, more of those horrible beasts begin chasing you all over again! It's almost enough to make you give up exploring. . . Naw!

Tut's Tomb is a machine language arcade game comprised of three separate parts, each of which contains five mazes. Four BASIC programs make up the machine language program of Part 1, TUT1; two BASIC programs make up the machine language program of Part 2, TUT2; and two BASIC programs make up the machine language program of Part 3, TUT3.

Due to space limitations, only the BASIC listings that generate the machine language program of Part 1, TUT1, are presented this month. TUT2 and TUT3 cannot be loaded or run until you complete the fifth maze of TUT1. [You may need more than a month to get through the first five mazes of *Tut's Tomb*!] Onscreen loading instructions for Part 2 are presented at this time, along with a clue for solving the final maze of Part 3. The computer will appear to lock up. Simply press RESET and load the next part according to the instructions. The BASIC listings that create Part 2 and Part 3 will appear next month.

Use the following procedure to create Part 1 of *Tut's Tomb*:

- 1) Enter POKE 113,0 and reset the computer to do a cold start;
- 2) Type in listings 1 through 4 and

save them to tape or disk using the filenames ONE, TWO, THREE and FOUR, respectively;

- 3) Load and run each BASIC program in order;
- 4) At the final OK prompt, save the machine language program, TUT1, to tape or disk (tape users type CSAVER) using the following command: (C)SAVER"TUT1", 20479, 26405, 26405.

To move the machine language program, TUT1, to its proper memory location, follow these steps:

- 1) Enter POKE113,0 and reset the computer to do a cold start;
- 2) Enter (C)LOADM"TUT1", 49152 (tape users type CLOADM);
- 3) Resave the file by entering (C)SAVER"TUT1", 4095, 10021, 10011;
- 4) Enter EXEC10011.

In the future, if you followed Step 3 above, you need only load the file and enter EXEC.

Game Play

Use the right joystick to move the explorer up, down, left and right. Press the firebutton on the joystick to begin each level of play. To shoot the musket, press the firebutton while pointing the joystick in the desired direction (it will only fire right and left).

There are five types of creatures that will menace you, and you can score a variable amount of points by killing them:

Creature	Points
Scorpion-tailed bats	10
Blue serpents	20
Giant spiders	40
Disembodied dragon heads	60
Curses	80

Also, there are five types of treasure with variable point values:

Treasure	Points
Diamond rings	1,000
Priceless vases	2,000
Jewel boxes	3,000
Red sapphire pots	4,000
Gold crown	5,000

To exit a maze you must first obtain the key contained in that maze. To get a key, all you have to do is move up beside it. The key will disappear and be displayed at the top of the screen (under your score). You may then exit by going to the end of the maze, avoiding or killing the creatures along the way. Note that your feet must be touching the ground in order to exit.

Hints

- You can kill the creatures only by shooting them in the upper part of their bodies.
- Every time a creature is killed near its lair (the hole in the wall surrounded by red bricks), a new one appears in its place. New creatures either duplicate or exit the lair, so don't stand near it while shooting.
- Creatures are not always fatal when touched. In some cases, they can be bounced off the explorer's head.
- After completing the five mazes presented in Part 1, a clue is given describing how to escape the last maze of Part 3, TUT3.
- In some of the mazes, the explorer has the ability to fire through bricks (one of the handy bugs I purposely left in the program).

(Questions or comments regarding this program may be directed to the author at 2369 Madison #9, Montreal, Quebec, Canada H4B 2T5. Please enclose an SASE when requesting a reply.) ☐

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Editor's Note: For your convenience, the machine language files for TUT2 and TUT3 will be included on this month's RAINBOW ON TAPE and DISK, immediately following TUT1. The BASIC listings that make up these two machine language programs will be printed in next month's issue.

✓	140	.....149	1270	.....58
	290	.....21	1410	.....125
	510	.....128	1600	.....207
	680	.....91	1760	.....161
	890	.....214	END	.....135
	1060	.....103		

Listing 1: ONE

```

5 CLEAR 1000,&H4FFE
10 REM %%%%%%%%%%
    %%% PART #1 TUT %%%
    %%% RUN THEN LOAD #2 %%%
    %%%%%%%%%%
15 FOR X=20479 TO 21959:READ DT:
POKE X,DT:NEXT X
20 DATA 189,18,118,189,23,112,18
9,23
30 DATA 135,189,38,229,189,23,17
4,189
40 DATA 23,220,189,24,5,189,24,9
3
50 DATA 127,30,250,134,1,183,31,
54
60 DATA 183,31,55,134,240,183,31
,24
70 DATA 189,25,3,189,24,112,189,
25
80 DATA 200,189,27,14,189,27,90,
189
90 DATA 18,92,182,255,0,129,254,
39
100 DATA 4,129,126,38,245,189,37
,76
110 DATA 189,37,164,189,38,82,18
9,38
120 DATA 125,79,177,30,237,38,19
,189
130 DATA 20,10,182,255,0,129,254
,16
140 DATA 39,255,157,129,126,38,2
43,126
150 DATA 15,255,189,26,190,189,3
7,206
160 DATA 189,28,110,189,29,35,18
9,16
170 DATA 162,189,16,152,189,30,1
24,189
180 DATA 25,200,189,23,174,189,3
6,235
190 DATA 16,142,0,0,49,33,16,140

```

```

200 DATA 9,196,39,2,32,246,126,1
6
210 DATA 68,79,189,25,228,57,128
,184
220 DATA 255,15,57,182,39,116,12
9,180
230 DATA 36,7,139,60,183,39,116,
32
240 DATA 3,127,39,116,189,29,109
,57
250 DATA 57,255,255,255,255,255,
255,255
260 DATA 255,0,0,0,0,0,0,0
270 DATA 0,0,0,0,0,134,128,184
280 DATA 255,15,182,255,15,183,4
,0
290 DATA 32,243,0,0,0,0,0,0
300 DATA 0,0,0,0,4,0,0,0
310 DATA 0,0,0,0,0,0,0,0
320 DATA 4,0,0,0,0,0,0,0
330 DATA 0,0,0,0,0,0,0,0
340 DATA 83,251,255,255,255,255,
255,255
350 DATA 255,255,255,255,255,255
,255,255
360 DATA 255,255,255,255,255,255
,255,255
370 DATA 255,255,255,255,255,255
,255,255
380 DATA 255,255,255,255,255,255
,255,255
390 DATA 255,255,255,255,255,255
,255,255
400 DATA 255,255,255,255,255,255
,255,255
410 DATA 255,255,255,255,255,255
,255,255
420 DATA 255,0,0,0,0,0,0,0
430 DATA 0,0,0,0,0,0,0,0
440 DATA 0,0,0,0,0,0,0,0
450 DATA 0,0,0,0,0,0,0,0
460 DATA 0,0,0,0,0,0,0,0
470 DATA 0,0,0,0,0,0,0,0
480 DATA 0,0,0,0,0,0,0,0
490 DATA 0,0,0,0,0,0,0,0
500 DATA 35,255,255,255,255,255,
255,255
510 DATA 255,255,255,255,255,255
,255,255
520 DATA 255,255,255,255,255,189
,21,224
530 DATA 189,21,224,189,21,224,1
27,255
540 DATA 201,127,255,34,127,255,
202,127
550 DATA 255,206,127,255,192,127
,255,194
560 DATA 127,255,196,142,17,248,
16,142
570 DATA 4,0,95,166,128,167,160,
92

```


58Ø DATA 193,78,39,2,32,245,182,3Ø
 59Ø DATA 22Ø,183,15,161,182,3Ø,221,183
 60Ø DATA 15,162,182,3Ø,222,183,15,163
 61Ø DATA 182,3Ø,223,183,15,164,182,3Ø
 62Ø DATA 224,183,15,165,134,56,183,15
 63Ø DATA 16Ø,57,4,4,4,4,4,4
 64Ø DATA 4,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 65Ø DATA Ø,3,12,21,5,32,14,15
 66Ø DATA 2Ø,8,9,14,7,32,5,17
 67Ø DATA 21,1,12,19,32,19,15,13
 68Ø DATA 5,2Ø,8,9,14,7,32,32
 69Ø DATA 32,3,15,14,7,18,1,2Ø
 70Ø DATA 21,12,1,2Ø,9,15,14,19
 71Ø DATA 32,6,9,14,9,19,8,5
 72Ø DATA 4,32,16,1,18,2Ø,15,14
 73Ø DATA 5,12,15,1,4,32,14,5
 74Ø DATA 24,2Ø,32,16,1,18,2Ø,Ø
 75Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 76Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 77Ø DATA Ø,Ø,Ø,Ø,Ø,134,255,183
 78Ø DATA 43,196,183,43,197,183,43,198
 79Ø DATA 183,43,199,183,43,164,183,43

80Ø DATA 165,183,43,166,183,43,167,189
 81Ø DATA 21,224,189,21,224,189,21,224
 82Ø DATA 182,3Ø,22Ø,177,3Ø,23Ø,34,42
 83Ø DATA 37,7Ø,182,3Ø,221,177,3Ø,231
 84Ø DATA 34,32,37,6Ø,182,3Ø,222,177
 85Ø DATA 3Ø,232,34,22,37,5Ø,182,3Ø
 86Ø DATA 223,177,3Ø,233,34,12,37,4Ø
 87Ø DATA 182,3Ø,224,177,3Ø,234,34,2
 88Ø DATA 32,3Ø,182,3Ø,22Ø,183,3Ø,23Ø
 89Ø DATA 182,3Ø,221,183,3Ø,231,182,3Ø
 90Ø DATA 222,183,3Ø,232,182,3Ø,223,183
 91Ø DATA 3Ø,233,182,3Ø,224,183,3Ø,234
 92Ø DATA 189,27,66,57,Ø,Ø,Ø,Ø
 93Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 94Ø DATA Ø,Ø,Ø,Ø,4,Ø,Ø,Ø
 95Ø DATA Ø,Ø,4,Ø,4,Ø,4,Ø
 96Ø DATA 4,Ø,Ø,Ø,Ø,Ø,Ø,Ø

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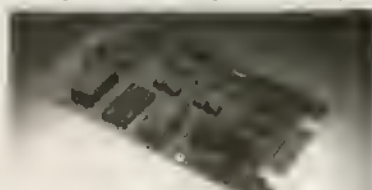
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97Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 98Ø DATA 194,251,255,255,255,255
 ,255,255
 99Ø DATA 255,187,185,197,161,222
 ,7,255
 100Ø DATA 82,161,197,11,Ø,Ø,171,
 238
 101Ø DATA 161,181,1,2,221,161,16
 1,2
 102Ø DATA 4,16Ø,24Ø,Ø,255,66,89,
 32
 103Ø DATA 67,72,82,73,83,32,77,6
 7
 104Ø DATA 75,69,82,78,65,78,255,
 255
 105Ø DATA 255,255,255,255,255,25
 5,255,255
 106Ø DATA 255,3,1,13,Ø,Ø,Ø,Ø
 107Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 108Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 109Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 110Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 111Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 112Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 113Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 114Ø DATA 193,255,255,255,255,25
 5,74,32
 115Ø DATA 32,255,255,255,255,255
 ,255,255
 116Ø DATA 255,255,255,255,255,25
 5,255,255
 117Ø DATA 255,255,255,255,255,25
 5,255,255
 118Ø DATA 255,255,255,255,255,25
 5,255,255
 119Ø DATA 255,255,255,255,255,25
 5,255,255
 120Ø DATA 255,255,255,255,255,25
 5,255,255
 121Ø DATA 255,255,255,255,255,25
 5,255,255
 122Ø DATA 255,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 123Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,28,185
 124Ø DATA 187,185,197,162,3Ø,13,
 185,236
 125Ø DATA 187,185,197,189,51,177
 ,1Ø6,Ø
 126Ø DATA 188,225,183,77,174,84,
 173,45
 127Ø DATA 173,196,Ø,Ø,Ø,Ø,Ø,85
 128Ø DATA 85,85,85,85,85,85,85,8
 5
 129Ø DATA 85,85,85,85,85,85,85,8
 5
 130Ø DATA 85,85,85,85,85,85,85,8
 5
 131Ø DATA 85,85,85,142,42,77,134
 ,13
 132Ø DATA 189,23,148,142,42,78,1
 34,19
 133Ø DATA 189,23,148,142,42,79,1

34,2Ø
 134Ø DATA 189,23,148,142,42,8Ø,1
 34,21
 135Ø DATA 189,23,148,142,42,82,1
 34,22
 136Ø DATA 189,23,148,142,42,83,1
 34,23
 137Ø DATA 189,23,148,142,42,84,1
 34,24
 138Ø DATA 189,23,148,142,42,85,1
 34,25
 139Ø DATA 189,23,148,57,7Ø,68,32
 ,13
 140Ø DATA Ø,198,3Ø,247,2Ø,179,13
 4,255
 141Ø DATA 16,142,Ø,15,189,23,51,
 246
 142Ø DATA 2Ø,179,9Ø,193,1,39,5,2
 47
 143Ø DATA 2Ø,179,32,234,57,Ø,Ø,Ø
 144Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 145Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 146Ø DATA Ø,118,255,255,255,255,
 255,255
 147Ø DATA 255,255,255,255,255,25
 5,255,255
 148Ø DATA 255,255,255,255,255,25
 5,255,255
 149Ø DATA 255,255,255,255,255,25
 5,255,255
 150Ø DATA 255,255,255,255,255,25
 5,255,84
 151Ø DATA 85,84,84,69,84,85,84,6
 6
 152Ø DATA 13,13,13,32,2,191,21,2
 2
 153Ø DATA 142,36,14,16,142,Ø,2,1
 34
 154Ø DATA 255,23Ø,132,189,23,51,
 48,1
 155Ø DATA 14Ø,36,33,46,2,32,236,
 19Ø
 156Ø DATA 21,22,57,Ø,Ø,Ø,Ø,Ø
 157Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 158Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 159Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 160Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 161Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 162Ø DATA Ø,25,255,255,255,255,2
 55,255
 163Ø DATA 255,255,255,255,255,25
 5,255,255
 164Ø DATA 255,255,255,255,255,25
 5,255,59
 165Ø DATA 235,16,142,Ø,Ø,49,33,1
 6
 166Ø DATA 14Ø,15,16Ø,38,248,57,1
 98,5Ø
 167Ø DATA 16,142,Ø,4Ø,189,23,51,
 134
 168Ø DATA 255,198,3Ø,16,142,Ø,2Ø

,189
 169Ø DATA 23,51,57,12Ø,246,21,11
 9,9Ø
 17ØØ DATA 193,3Ø,37,5,247,21,119
 ,32
 171Ø DATA 223,57,Ø,16,142,31,49,
 189
 172Ø DATA 37,37,57,Ø,Ø,Ø,Ø,Ø
 173Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
 174Ø DATA 5,185,161,161,222,7,25
 5,82
 175Ø DATA 161,197,11,Ø,Ø,171,238
 ,161
 176Ø DATA 181,1,2,221,161,161,2,
 4
 177Ø DATA 3Ø,Ø,79,Ø,Ø,Ø,Ø,Ø
 178Ø DATA 27,255,255,255,255,255
 ,255,255
 179Ø DATA 255,255,255,255,255,83
 ,84,69
 18ØØ DATA 83,84,7Ø,7Ø,7Ø,7Ø,7Ø,8
 4
 181Ø DATA 85,84,66,65,83,73,67,6
 7
 182Ø DATA 67,67,67,67,67,67,67,6
 7
 183Ø DATA 67,67,67,67,67,67,255,
 134
 184Ø DATA 255,198,5Ø,16,142,Ø,23

Ø,189
 185Ø DATA 23,51,134,255,198,25,1
 6,142
 186Ø DATA Ø,115,189,23,51,134,25
 5,198
 187Ø DATA 5Ø

✓ 160	230	1090	168
320	226	1230	73
490	123	1410	147
630	99	1540	115
790	198	1690	96
930	43	ENO	189

Listing 2: TWO

1Ø REM %%%%%%%%%%%%%%%
 %%% PART #2 TUT %%%
 %%% RUN THEN LOAD #3 %%%
 %%%%%%%%%%%%%%%
 15 FOR X=2196Ø TO 234ØØ:READ DT:
 POKE X,DT:NEXT X
 2Ø DATA 16,142,Ø,23Ø,189,23,51,5
 7
 3Ø DATA 171,67,67,67,67,67,67,67
 4Ø DATA 67,67,67,67,67,67,67,Ø
 5Ø DATA 134,255,198,3Ø,16,142,Ø,
 1ØØ

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60 DATA 189,23,51,134,200,198,30
 ,16
 70 DATA 142,0,90,189,23,51,134,2
 55
 80 DATA 198,30,16,142,0,90,189,2
 3
 90 DATA 51,134,200,198,25,16,142
 ,0
 100 DATA 110,189,23,51,134,200,1
 98,30
 110 DATA 16,142,0,110,189,23,51,
 57
 120 DATA 255,255,255,255,255,255
 ,255,255
 130 DATA 255,255,255,255,255,255
 ,255,13
 140 DATA 78,85,82,67,67,67,67,67
 150 DATA 67,67,67,67,67,67,67,67
 160 DATA 67,67,67,67,67,67,67,67
 170 DATA 67,67,67,13,190,39,214,
 189
 180 DATA 27,112,190,31,6,188,39,
 214
 190 DATA 38,6,204,0,0,253,31,6
 200 DATA 190,31,8,188,39,214,38,
 6
 210 DATA 204,0,0,253,31,8,190,31
 220 DATA 10,188,39,214,38,6,204,
 0
 230 DATA 0,253,31,10,190,31,12,1
 88
 240 DATA 39,214,38,6,204,0,0,253
 250 DATA 31,12,190,31,14,188,39,
 214
 260 DATA 38,6,204,0,0,253,31,14
 270 DATA 190,31,16,188,39,214,38
 ,6
 280 DATA 204,0,0,253,31,16,189,2
 1
 290 DATA 24,190,39,214,189,27,13
 7,57
 300 DATA 38,52,182,40,161,129,0,
 38
 310 DATA 45,182,58,61,129,0,38,3
 8
 320 DATA 182,58,33,129,0,38,31,1
 82
 330 DATA 30,235,129,9,44,24,76,1
 83
 340 DATA 30,235,189,25,37,134,85
 ,183
 350 DATA 40,189,183,40,161,183,5
 8,61
 360 DATA 183,58,33,189,21,202,57
 ,0
 370 DATA 0,0,0,0,231,137,255,65
 380 DATA 231,136,161,57,0,0,182,
 30
 390 DATA 223,129,10,37,8,128,10,
 183
 400 DATA 30,223,124,30,222,182,3

0,222
 410 DATA 129,10,37,8,128,10,183,
 30
 420 DATA 222,124,30,221,182,30,2
 21,129
 430 DATA 10,37,8,128,10,183,30,2
 21
 440 DATA 124,30,220,182,30,220,1
 29,10
 450 DATA 37,16,128,10,183,30,220
 ,182
 460 DATA 30,237,76,129,9,46,3,18
 3
 470 DATA 30,237,57,183,30,225,18
 2,255
 480 DATA 3,132,247,183,255,3,182
 ,255
 490 DATA 1,132,247,183,255,1,134
 ,8
 500 DATA 186,255,35,183,255,35,1
 6,191
 510 DATA 30,228,16,190,30,228,18
 2,30
 520 DATA 225,183,255,32,49,63,38
 ,252
 530 DATA 79,183,255,32,16,190,30
 ,228
 540 DATA 49,63,38,252,90,38,227,
 57
 550 DATA 134,0,183,255,197,183,2
 55,195
 560 DATA 183,255,203,183,255,207
 ,183,255
 570 DATA 200,134,255,183,255,34,
 57,134
 580 DATA 0,142,40,0,167,128,140,
 64
 590 DATA 0,38,249,57,16,142,31,6
 4
 600 DATA 198,7,61,49,171,198,0,1
 66
 610 DATA 160,167,132,48,136,32,9
 2,193
 620 DATA 7,39,2,32,242,57,142,41
 630 DATA 2,182,30,220,189,23,148
 ,142
 640 DATA 41,3,182,30,221,189,23,
 148
 650 DATA 142,41,4,182,30,222,189
 ,23
 660 DATA 148,142,41,5,182,30,223
 ,189
 670 DATA 23,148,142,41,6,182,30,
 224
 680 DATA 189,23,148,57,142,40,13
 ,134
 690 DATA 11,189,23,148,142,40,14
 ,134
 700 DATA 12,189,23,148,142,40,15
 ,134
 710 DATA 13,189,23,148,142,40,16

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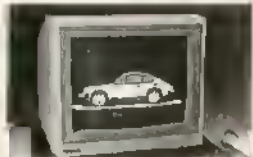
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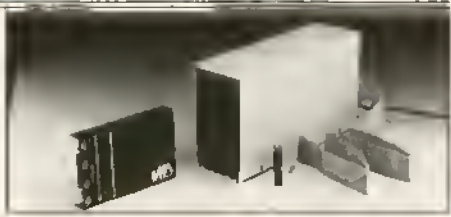


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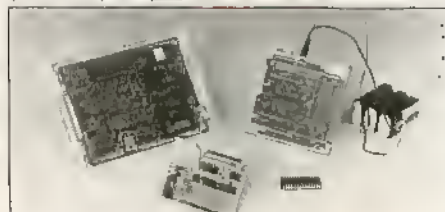
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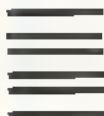
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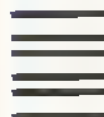
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,134
 720 DATA 14,189,23,148,142,40,17
 ,134
 730 DATA 15,189,23,148,57,142,41
 ,13
 740 DATA 182,30,230,189,23,148,1
 42,41
 750 DATA 14,182,30,231,189,23,14
 8,142
 760 DATA 41,15,182,30,232,189,23
 ,148
 770 DATA 142,41,16,182,30,233,18
 9,23
 780 DATA 148,142,41,17,182,30,23
 4,189
 790 DATA 23,148,57,142,40,108,13
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 810 DATA 189,35,115,142,40,110,1
 34,18
 820 DATA 189,35,115,142,40,111,1
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 840 DATA 235,189,35,115,57,142,4
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 860 DATA 21,182,30,237,189,23,14
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 870 DATA 182,30,250,198,64,61,14
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 880 DATA 8,48,139,191,39,215,79,
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 890 DATA 16,142,43,224,16,191,39
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 900 DATA 189,24,200,166,132,189,
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 910 DATA 189,24,184,189,24,184,1
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 920 DATA 184,189,24,184,189,24,1
 84,189
 930 DATA 24,184,189,24,184,92,19
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 940 DATA 39,45,189,24,200,49,169
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 950 DATA 100,48,1,189,24,208,32,
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 960 DATA 189,24,200,48,1,49,36,1
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 970 DATA 132,189,24,208,189,24,2
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 980 DATA 190,39,215,16,190,39,21
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 990 DATA 191,39,215,16,191,39,21
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 1010 DATA 72,48,139,79,95,166,12
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1020 DATA 164,166,128,167,33,166
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 1030 DATA 34,166,128,167,35,92,1
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 1040 DATA 39,5,49,168,32,32,230,
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 1050 DATA 39,212,57,182,30,250,1
 98,2
 1060 DATA 61,253,39,214,142,34,2
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 1070 DATA 139,236,132,253,30,248
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 1090 DATA 253,31,2,252,39,214,14
 2,35
 1100 DATA 14,48,139,236,132,253,
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 1110 DATA 252,39,214,142,35,24,4
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 1120 DATA 236,132,253,30,253,252
 ,39,214
 1130 DATA 142,35,34,48,139,236,1
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 1140 DATA 31,4,182,30,250,183,31
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 1150 DATA 183,31,18,204,0,0,253,
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 1160 DATA 6,253,31,8,253,31,10,2
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 1170 DATA 31,12,253,31,14,253,31
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 1180 DATA 252,30,248,253,30,251,
 57,190
 1190 DATA 30,251,48,136,224,140,
 43,224
 1200 DATA 37,17,190,30,251,95,22
 5,136
 1210 DATA 192,38,8,225,136,193,3
 8,3
 1220 DATA 134,1,57,79,57,190,30,
 251
 1230 DATA 95,225,137,2,64,38,9,2
 25
 1240 DATA 137,2,65,38,3,134,1,57
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 5,31
 1260 DATA 38,9,225,137,1,255,38,
 3
 1270 DATA 134,1,57,79,57,190,30,
 251
 1280 DATA 95,225,2,38,9,225,137,
 2
 1290 DATA 2,38,3,134,1,57,79,57
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 16,79
 1310 DATA 95,166,160,167,132,166
 ,160,167
 1320 DATA 1,92,193,17,39,5,48,13
 6
 1330 DATA 32,32,238,57,190,30,25

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1,95
1340 DATA 167,132,167,1,92,193,1
7,39
1350 DATA 5,48,136,32,32,242,57,
189
1360 DATA 25,111,129,0,39,15,189
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1370 DATA 152,190,30,251,48,136,
192,191
1380 DATA 30,251,189,25,200,57,1
89,25
1390 DATA 141,129,0,39,15,189,16
,152
1400 DATA 190,30,251,48,136,64,1
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1410 DATA 251,189,25,200,57,189,
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1420 DATA 129,0,39,14,189,16,152
,190
1430 DATA 30,251,48,31,191,30,25
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1440 DATA 25,200,57,189,25,181,1
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1450 DATA 39,14,189,16,152,190,3
0,251
1460 DATA 48,1,191,30,251,189,25
,200
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4,16
1520 DATA 188,39,214,39,4,231,16
0,32
1530 DATA 242,189,27,192,57,190,
30,251
1540 DATA 79,198,255,48,137,0,19
1,166
1550 DATA 132,129,0,38,6,231,132
,48
1560 DATA 31,32,244,189,20,180,9
5,18
1570 DATA 16,190,30,251,49,169,0
,191
1580 DATA 95,191,39,214,16,188,3
9,214
1590 DATA 39,6,231,164,49,63,32,
240
1600 DATA 48,31,189,27,192,57,17
3,159
1610 DATA 160,10,182,1,90,129,59
,37
1620 DATA 15,189,26,254,129,254,
39,50
1630 DATA 129,126,39,46,189,26,5
9,57

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,129
1650 DATA 254,39,36,129,126,39,3
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1660 DATA 26,37,57,182,1,91,129,
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1670 DATA 37,4,189,26,14,57,129,
2
1680 DATA 46,16,189,25,247,57,18
2,255
1690 DATA 0,57,189,26,82,32,3,18
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1700 DATA 26,133,189,25,200,57,1
82,30
1710 DATA 250,198,20,61,142,35,5
0,48
1720 DATA 139,95,16,190,30,255,1
89,27
1730 DATA 35,32,19,166,128,167,1
64,166
1740 DATA 128,167,33,92,193,10,3
9,5
1750 DATA 49,168,32,32,238,57,14
2,36
1760 DATA 14,16,190,30,253,95,18
9,27
1770 DATA 35,57,134,3,183,30,237
,127
1780 DATA 30,220,127,30,221,127,
30,222
1790 DATA 127,30,223,127,30,224,
127,30
1800 DATA 250,57,204,0,0,253,31,
6
1810 DATA 253,31,8,253,31,10,253
,31
1820 DATA 12

```

✓	180	.....91	1150	.....54
	310	.....57	1320	.....182
	470	.....49	1470	.....240
	650	.....124	1750	.....30
	830	.....136	END	.....65
	970	.....196		

Listing 3: THREE

```

10 REM *****
   ***      PART #3 TUT      ***
   *** CONTAINS MAZE DATA***
   *** RUN THEN LOAD #4 ***
   *****
15 FOR X=23401 TO 24921:READ DT:
POKE X,DT:NEXT X
20 DATA 253,31,14,253,31,16,57,1
6
30 DATA 142,35,250,79,95,166,160
,167
40 DATA 132,166,160,167,1,92,193

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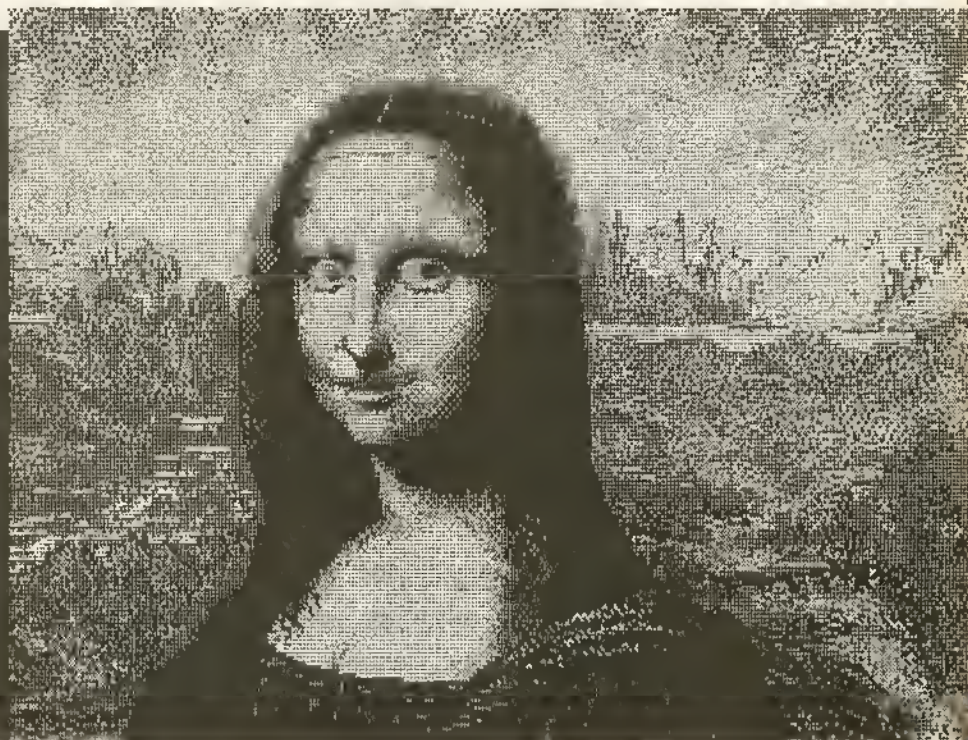
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Super I/O Board for OS-9

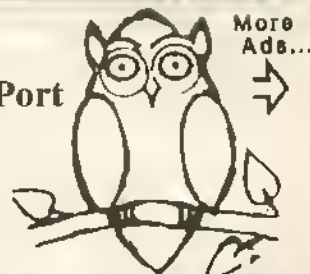
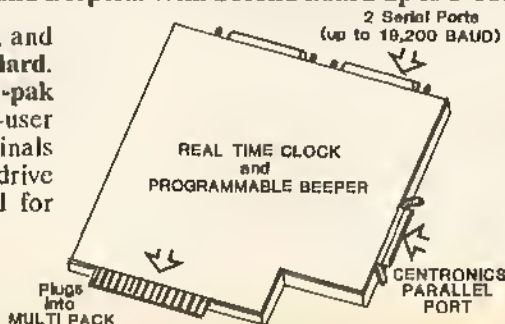
Each Board Provides 2 Serial Ports and Centronics Parallel Port

First Board has Real Time Clock and Beeper... With Second Board up to 5 Users

The serial ports are usable up to 19,200 Band, and the parallel port is a true Centronics standard. Plug into your multi-pak. On CoCo 3, multi-pak must be upgraded. You will have a multi-user system with additional computers or terminals plugged into the serial ports. An OWL hard drive and 512K upgrade are strongly recommended for multi-user systems.

Intro Price... \$169.

BOARD 2... \$145.



OWL-WARE

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Mertztown, PA 19539

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OWL-WARE

Proven

On the Razor's Edge of

Basic and OS-9 Hard Drive Systems

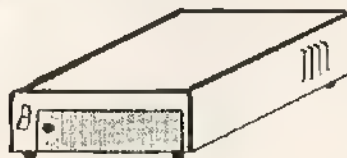
Proven Performance for Demanding Home or Business Users

Every hard drive which has been produced by OWL-WARE during the last 3 years is **complete**. A system consists of software, hard drive, controller, heavy-duty power supply, and LR Tech Interface. There are no hidden costs for assembly or testing. When a drive system is ordered, we fully **assemble, test, and burn-in** the system for 3 full days. This ensures dependability and optimum performance.

We have now been supplying CoCo hard drive systems and parts for more than 3 years. This is the longest history in the CoCo market of any system. Some other advertisers are stating that they have one of the most reliable systems for the CoCo with *all of 4 months history in the CoCo hard drive market!* We have reached our position in the hard drive market by providing our customers with a quality product that they (and we) can be proud to own and use.

Because of many requests for a lower price system in kit form, we are now selling a kit of all parts at a significant discount compared to our regular prices. We recommend this kit (or any kits offered by any other supplier) only to those who have experience in electronic assembly and OS-9.

**For OS-9
Levels 1
and 2**



10 Meg. 20 Meg. 40 Meg. 80 Meg.

(2 X 40 Meg.)

System Prices: (Includes Hard Drive, Controller, LR Tech Interface, Software. Fully assembled and tested.)

\$469. \$599. \$725. \$1,069.

Kit Prices: (LR Tech System as above but not assembled or tested.)

\$419. \$549. \$659. \$ 999.

Kit Prices: (As above but using Burke & Burke bus adapter)

(na) \$519. \$629. (na)

30 Meg Kit: \$559.

OWL Hard Drive BASIC 3

There have been several ads in this magazine about BASIC for Color Computer hard drive systems. These ads sometimes only tell a part of the story. Our BASIC system price includes assembly, testing, and 3-day burn-in period. We do not require a Multi-pak to operate.

Our hard drive systems are fast, reliable, and reasonable in price. This has been proven by hundreds of users over the past 3 years. We do not have to turn off error checking for speed. We achieve high speed BASIC from a unique indexing method.

The table below will summarize some of the key points about our BASIC hard drive system and two other systems. We believe that we have the best BASIC interface for CoCo hard drives available.

BASIC Hard Drive Systems*

Feature	OWL	B&B	RGB
Drive Portion Available	Entire	Entire(?)	Entire
User Sets BASIC/OS-9 Partitions	YES	Yes	No
Add to Existing OS-9 Drive Without Reformat	YES	Yes(?)	No
Drives 0-3 Hard/Floppy	YES	No	Yes
Built in Park	YES	No	Yes
Speed*	FAST	Fast	Fast

*All feature details are believed to be true at time of writing and are subject to change. We believe that our BASIC hard drives are the fastest due to our indexing method, but all three systems are fast. On ours all BASIC commands work including DSKINI, DSKI\$, and DSKO\$.

Prices: With/Without Hard Drive
\$35./\$79.

Technology

the Color Computer Frontier

DISK DRIVES

Bonus!
Special
Bundled
Software
with any
Disk Drive
Purchase!



Floppy Drive Systems

The Highest Quality for Service Now and for Years to Come

Use our WHISPER DRIVE for the finest, quietest drive

Drive 0 Systems (Half Height, Double Sided, Direct Drives) **\$219.**

Drive 0 systems complete with drive, controller, legal DOS, cable, case, power supply, and manual

Drive 1 Systems (Half Height, Double Sided, Direct Drives) **\$129.**

New 3.5", 720K Drives for OS-9 with case & Power Supply \$179.

Drive 1 Systems have drive, case, power supply. (You may require optional cable and/or DOS chip to use)

Special for 0/1 Combos (Drives 0,1,2,3) **\$315.**

HALF-HEIGHT DRIVE UPGRADES FOR RS HORIZONTAL CASES

Why only double the capacity of your system when you can triple in the same case? Kit includes: double-sided to fit your case, chip to run both sides of new drive, hardware, and detailed instructions. Easy! Takes only 5 minutes!

Model \$119. Model \$129.

500

501 or 502

All drives are new and fully assembled. We ship only FULLY TESTED and CERTIFIED at these low prices. We use Fuji, YE Data, and other fine brands. No drives are used or surplus unless otherwise stated to you when you order. We appear to be the one of the few advertisers in Rainbow who can truly make this claim. We have 5 years experience in the CoCo disk drive market! We are able to provide support when you have a problem.

Drives 1 Year Warranty

OWL Phones

Order Numbers (only)

1-800-245-6228

1-215-682-6855

Technical Help

1-215-837-1917

OWL WARE Software Bundle

Disk Tutorial/Utilities/Games DISK TUTOR Ver 1.1

Learn how to use your disk drive from this multi-lesson, machine language program. This tutor takes you through your lessons and corrects your mistakes for a quick, painless disk drive introduction. (This professionally written tutor is easily worth the bundle's total price.)

OWL DOS

An operating system that gives faster disk access and allows the use of double-sided drives. Corrects a floating point number error on early CoCo systems.

COPY-IT

Quickly copies selected programs between disks. A wild card option selects groups of programs to copy.

VERIFY

Verifies reading of each sector. Bad sectors are listed on the screen.

2 GAMES

We will select 2 games from our stock. These sold for more than \$20 each.

If sold separately this is more than \$125 worth of software!!

Do not mistake this software with cheap, non-professional "Public Domain" software which is being offered by others. All of this software is copyrighted and professional in quality. The tutor is unique with us and has helped thousands of new users learn their disk drive.

**only \$27.95
(or even better)
only \$6.95 with**

Our prices include a discount for cash but do not include shipping.

OWL-WARE has a liberal warranty policy. During the warranty period, all defective items will be repaired or replaced at our option at no cost to the buyer except for shipping costs. Call our tech number for return. Return of non-defective or unauthorized returns are subject to a service charge.

OWL-WARE

P.O. BOX 116

Mertztown, PA 19539

,10
50 DATA 39,5,48,136,32,32,238,57
60 DATA 79,95,167,132,167,1,92,1
93
70 DATA 10,39,5,48,136,32,32,242
80 DATA 57,189,36,44,57,0,38,4
90 DATA 134,1,32,26,129,1,38,4
100 DATA 134,2,32,18,129,2,38,4
110 DATA 134,4,32,10,129,3,38,4
120 DATA 134,6,32,2,134,8,187,16
130 DATA 190,31,6,189,27,235,16,
190
140 DATA 31,8,189,27,235,16,190,
31
150 DATA 10,189,27,235,16,190,31
,12
160 DATA 189,27,235,16,190,31,14
,189
170 DATA 27,235,16,190,31,16,189
,27
180 DATA 235,57,16,140,0,0,39,24
9
190 DATA 140,0,0,39,244,31,32,18
9
200 DATA 28,29,189,28,41,189,28,
29
210 DATA 189,28,41,189,28,29,189
,28
220 DATA 41,189,28,29,189,28,41,
189
230 DATA 28,29,189,28,41,189,28,
29
240 DATA 189,28,41,57,16,191,39,
214
250 DATA 188,39,214,39,16,49,33,
57
260 DATA 16,191,39,214,188,39,21
4,39
270 DATA 4,49,168,31,57,253,39,2
14
280 DATA 190,39,214,189,27,112,1
90,39
290 DATA 214,189,27,137,189,27,1
54,189
300 DATA 22,68,142,0,0,57,182,30
310 DATA 250,198,20,61,16,142,35
,150
320 DATA 49,171,95,166,160,167,1
32,166
330 DATA 160,167,1,92,193,10,39,
5
340 DATA 48,136,32,32,238,190,31
,6
350 DATA 16,142,31,6,134,42,189,
28
360 DATA 183,190,31,8,16,142,31,
8
370 DATA 134,84,189,28,183,190,3
1,10
380 DATA 16,142,31,10,134,126,18
9,28

390 DATA 183,190,31,12,16,142,31
,12
400 DATA 134,168,189,28,183,190,
31,14
410 DATA 16,142,31,14,134,210,18
9,28
420 DATA 183,190,31,16,16,142,31
,16
430 DATA 134,252,189,28,183,57,1
40,0
440 DATA 0,38,250,124,31,24,177,
31
450 DATA 24,34,19,190,31,4,175,1
64
460 DATA 189,28,79,134,240,177,3
1,24
470 DATA 38,227,127,31,24,57,128
,40
480 DATA 177,31,24,34,216,190,31
,4
490 DATA 189,27,112,57,79,95,161
,31
500 DATA 38,8,161,137,1,31,38,2
510 DATA 198,1,57,79,95,161,2,38
520 DATA 8,161,137,1,34,38,2,198
530 DATA 1,57,79,95,161,136,192,
38
540 DATA 7,161,136,193,38,2,198,
1
550 DATA 57,79,95,161,137,1,96,3
8
560 DATA 8,161,137,1,97,38,2,198
570 DATA 1,57,190,31,4,79,188,31
580 DATA 6,38,3,189,29,98,134,1
590 DATA 188,31,8,38,3,189,29,98
600 DATA 134,2,188,31,10,38,3,18
9
610 DATA 29,98,134,3,188,31,12,3
8
620 DATA 3,189,29,98,134,4,188,3
1
630 DATA 14,38,3,189,29,98,134,5
640 DATA 188,31,16,38,14,189,29,
98
650 DATA 57,16,142,31,44,49,166,
134
660 DATA 5,167,164,57,190,31,4,4
8
670 DATA 137,254,128,79,16,190,3
1,6
680 DATA 188,31,6,39,56,134,1,16
690 DATA 190,31,8,188,31,8,39,45
700 DATA 134,2,16,190,31,10,188,
31
710 DATA 10,39,34,134,3,16,190,3
1
720 DATA 12,188,31,12,39,23,134,
4
730 DATA 16,190,31,14,188,31,14,
39
740 DATA 12,134,5,16,190,31,16,1

88
 750 DATA 31,16,39,1,57,142,31,44
 760 DATA 48,134,16,188,30,251,34,6
 770 DATA 198,2,231,132,32,4,198,0
 780 DATA 231,132,182,39,116,129,180,38
 790 DATA 1,57,166,132,139,1,167,132
 800 DATA 57,190,39,214,189,28,229,193
 810 DATA 0,39,14,189,27,137,190,39
 820 DATA 214,48,31,191,39,214,189,28
 830 DATA 79,57,190,39,214,189,28,244
 840 DATA 193,0,39,14,189,27,137,190
 850 DATA 39,214,48,1,191,39,214,189
 860 DATA 28,79,57,190,39,214,189,29
 870 DATA 18,193,0,39,15,189,27,137
 880 DATA 190,39,214,48,136,64,191,39
 890 DATA 214,189,28,79,57,190,39,214
 900 DATA 189,29,3,193,0,39,15,189
 910 DATA 27,137,190,39,214,48,136,192
 920 DATA 191,39,214,189,28,79,57,140
 930 DATA 43,224,37,54,191,39,214,129
 940 DATA 0,38,7,189,29,243,189,30
 950 DATA 38,57,129,1,38,7,189,29
 960 DATA 218,189,30,38,57,129,2,38
 970 DATA 7,189,29,243,189,30,12,57
 980 DATA 129,3,38,7,189,29,218,189
 990 DATA 30,12,57,129,5,38,3,189
 1000 DATA 30,38,57,190,31,6,182,31
 1010 DATA 44,189,30,64,190,39,214,191
 1020 DATA 31,6,190,31,8,182,31,45
 1030 DATA 189,30,64,190,39,214,191,31
 1040 DATA 8,190,31,10,182,31,46,189
 1050 DATA 30,64,190,39,214,191,31,10
 1060 DATA 190,31,12,182,31,47,18

9,30
 1070 DATA 64,190,39,214,191,31,12,190
 1080 DATA 31,14,182,31,48,189,30,64
 1090 DATA 190,39,214,191,31,14,190,31
 1100 DATA 16,182,31,49,189,30,64,190
 1110 DATA 39,214,191,31,16,57,0,0
 1120 DATA 0,0,0,0,0,0,0,0
 1130 DATA 255,255,0,0,2,0,0,0
 1140 DATA 0,0,3,0,3,48,175,2
 1150 DATA 40,1,40,28,57,129,57,44
 1160 DATA 37,0,59,58,59,156,49,142
 1170 DATA 0,53,223,56,117,47,122,47
 1180 DATA 51,46,245,51,108,53,251,52
 1190 DATA 177,0,255,255,255,255,255,240
 1200 DATA 0,13,53,17,67,34,255,255
 1210 DATA 255,255,255,255,255,255,255,255
 1220 DATA 255,255,255,2,1,1,2,0
 1230 DATA 2,255,255,255,255,1,0,255
 1240 DATA 255,255,255,255,5,1,255,84
 1250 DATA 68,68,68,68,68,84,16,80
 1260 DATA 16,16,16,16,84,84,68,4
 1270 DATA 84,64,68,84,84,68,4,84
 1280 DATA 4,68,84,68,68,68,84,4
 1290 DATA 4,4,84,68,64,84,4,68
 1300 DATA 84,84,68,64,84,68,68,84
 1310 DATA 84,68,4,4,4,4,4,84
 1320 DATA 68,68,84,68,68,84,84,68
 1330 DATA 68,84,4,68,84,153,102,153
 1340 DATA 102,153,102,153,136,136,136,168
 1350 DATA 136,136,136,168,32,32,32,32
 1360 DATA 32,168,168,128,128,138,136,136
 1370 DATA 168,136,136,136,168,136,136,136
 1380 DATA 0,32,32,0,32,32,0,168
 1390 DATA 136,128,168,8,136,168,168,32
 1400 DATA 32,32,32,32,32,168,136,128
 1410 DATA 128,128,136,168,16,68,68,84

```

1420 DATA 68,68,68,136,168,136,1
36,136
1430 DATA 136,136,84,68,64,80,64
,68
1440 DATA 84,32,136,136,136,136,
136,32
1450 DATA 68,68,68,68,68,16,16,1
68
1460 DATA 136,128,168,128,136,16
8,80,68
1470 DATA 68,80,68,68,68,130,130
,136
1480 DATA 160,136,130,130,0,0,12
8,168
1490 DATA 128,130,170,130,162,16
2,138,4
1499 REM PART ONE'S MAZE DATA
1500 DATA 0,4,4,4,4,4,4,4
1510 DATA 0,4,4,0,0,0,4,4
1520 DATA 0,4,3,0,4,4,4,4
1530 DATA 0,4,0,0,4,4,4,4
1540 DATA 0,4,4,0,0,0,0,4
1550 DATA 0,0,0,0,1,4,4,4
1560 DATA 4,4,0,0,0,0,2,4
1570 DATA 4,4,4,4,4,4,4,4
1580 DATA 4,4,4,4,4,4,4,4
1590 DATA 0,2,4,4,0,0,2,4
1600 DATA 0,0,0,0,0,4,4,4
1610 DATA 4,4,0,1,0,4,4,0
1620 DATA 0,4,0,0,0,4,4,4
1630 DATA 0,4,0,4,0,4,4,4
1640 DATA 0,0,0,4,0,0,0,4
1650 DATA 4,4,4,4,4,4,4,4
1660 DATA 4,4,4,4,4,4,4,3
1670 DATA 0,0,0,0,4,0,4,4
1680 DATA 4,0,1,0,4,0,0,4
1690 DATA 4,0,4,0,4,0,4,4
1700 DATA 0,0,4,0,2,0,4,0
1710 DATA 0,0,4,0,4,0,4,4
1720 DATA 0,4,4,0,0,0,4,4
1730 DATA 4,4,4,4,4,4,4,4
1740 DATA 4,4,4,4,4,4,4,4
1750 DATA 4,4,3,0,4,4,4,0
1760 DATA 0,4,4,0,4,4,4,4
1770 DATA 0,4,4,0,0,4,4,3
1780 DATA 0,0,4,0,4,4,4,4
1790 DATA 0,0,0,0,0,0,4,4
1800 DATA 0,4,4,4,4,0,0,4
1810 DATA 1,4,4,4,4,4,4,4
1820 DATA 4,4,4,4,4,4,4,4
1830 DATA 0,0,0,0,4,0,0,4
1840 DATA 0,4,4,0,4,0,4,3
1850 DATA 0,0,4,0,2,0,4,4
1860 DATA 0,4,4,0,4,0,4,4
1870 DATA 0,4,0,0,4,0,4,0
1880 DATA 0,4,4,0,0,0,4,4
1890 DATA 4,4,4,1,4,4,4,0
1900 DATA 0,0,0,0,0,0,0,0
1910 DATA 0,0,0,0,0,0,0,0
1920 DATA 0

```

✓ 220	.....242	1330	.....45
410	.....246	1470	.....144
600	.....207	1620	.....234
790	.....171	1760	.....133
1020	.....105	END	.....45
1170	.....148		

Listing 4: FOUR

```

10 REM *****
*** LASTPART TUT ***
*** RUN THEN LOAD &RUN***
*** COPY PROGRAM ***
*****
15 FOR X=24922 TO 26405:READ DT:
POKE X,DT:NEXT X
20 DATA 0,0,0,0,0,0,0,0
30 DATA 0,0,0,0,0,0,0,0
40 DATA 0,0,0,0,0,0,0,0
50 DATA 0,0,0,0,0,0,0,0
60 DATA 0,0,0,0,0,0,0,0
70 DATA 0,0,0,0,0,0,0,0
80 DATA 0,0,0,0,0,0,0,0
90 DATA 0,0,0,0,0,0,62,0
100 DATA 0,250,58,0,0,171,42,0
110 DATA 0,163,58,0,0,135,54,0
120 DATA 0,147,50,0,0,167,58,0
130 DATA 0,171,58,0,0,170,62,0
140 DATA 0,171,0,0,0,160,254,170
150 DATA 170,250,70,170,170,164,
19,168
160 DATA 170,177,71,33,42,180,19
,52
170 DATA 74,49,71,49,18,52,19,52
180 DATA 71,49,71,33,19,52,255,4
2
190 DATA 255,63,0,0,0,85,85
200 DATA 87,234,253,87,212,70,25
5,87
210 DATA 245,18,255,223,244,70,2
55,255
220 DATA 245,19,0,0,52,71,0,0
230 DATA 53,19,0,0,52,71,0,0
240 DATA 55,255,0,0,52,0,0,0
250 DATA 55,63,0,0,55,52,0,0
260 DATA 55,49,0,0,55,52,0,0
270 DATA 55,49,0,0,247,52,247,25
5
280 DATA 215,49,213,255,215,52,8
5,127
290 DATA 87,63,85,85,84,0,43,21
300 DATA 85,85,33,21,253,87,55,2
3
310 DATA 255,87,51,23,255,223,52
,23
320 DATA 255,255,17,20,0,0,52,20
330 DATA 0,0,49,20,0,0,63,20
340 DATA 0,0,0,20,0,0,254,20
350 DATA 0,0,70,20,0,0,18,20
360 DATA 0,0,71,20,0,0,19,20

```


370 DATA 0,0,71,23,0,0,18,23
 380 DATA 247,255,70,21,213,255,2
 34,21
 390 DATA 85,127,0,21,85,85,43,25
 0
 400 DATA 62,191,33,210,52,71,55,
 70
 410 DATA 49,19,51,18,52,71,52,69
 420 DATA 49,19,17,17,20,69,52,69
 430 DATA 33,17,49,18,36,70,63,17
 0
 440 DATA 43,250,0,0,0,0,254,42
 450 DATA 191,63,70,49,19,52,18,5
 2
 460 DATA 71,49,71,17,19,52,19,20
 470 DATA 207,49,71,17,55,52,18,3
 6
 480 DATA 118,49,70,33,210,36,234
 ,47
 490 DATA 254,42,0,0,0,0,2,128
 500 DATA 10,160,170,170,255,240,
 63,48
 510 DATA 63,252,31,255,23,240,87
 ,224
 520 DATA 85,84,21,85,85,85,170,1
 70
 530 DATA 40,40,40,40,40,40,42,42
 540 DATA 44,37,53,224,56,96,48,2
 24
 550 DATA 58,224,53,223,58,223,48
 ,223
 560 DATA 58,223,46,95,49,142,47,
 8
 570 DATA 47,2,47,14,52,2,59,156
 580 DATA 47,28,54,148,54,130,52,
 20
 590 DATA 56,117,51,113,48,237,61
 ,101
 600 DATA 61,113,255,255,255,255,
 255,255
 610 DATA 0,0,63,252,31,244,19,19
 6
 620 DATA 6,144,8,32,32,8,32,8
 630 DATA 8,32,6,144,0,0,21,4
 640 DATA 5,17,1,65,10,161,42,168
 650 DATA 170,170,42,168,10,160,1
 ,64
 660 DATA 0,0,2,128,255,255,61,12
 4
 670 DATA 61,124,182,158,189,126,
 63,252
 680 DATA 63,252,255,255,4,16,1,6
 4
 690 DATA 3,192,1,64,5,144,86,165
 700 DATA 85,84,21,80,5,64,1,64
 710 DATA 42,168,170,170,157,222,
 42,168
 720 DATA 10,160,255,255,36,24,36
 ,24
 730 DATA 36,24,255,255,160,10,16
 8,42

740 DATA 41,104,43,232,9,96,9,96
 750 DATA 0,64,0,16,4,64,1,0
 760 DATA 5,80,31,244,7,253,1,244
 770 DATA 0,80,1,66,5,3,1,65
 780 DATA 1,69,0,85,4,16,17,132
 790 DATA 67,193,7,208,17,68,67,1
 93
 800 DATA 7,208,17,68,66,33,0,0
 810 DATA 0,20,0,85,0,117,0,85
 820 DATA 21,85,172,213,170,165,1
 87,20
 830 DATA 21,80,5,64,168,21,8,17
 840 DATA 40,80,32,64,131,234,171
 ,194
 850 DATA 1,8,5,40,68,32,84,42
 860 DATA 2,0,3,40,11,188,11,238
 870 DATA 46,172,187,188,175,166,
 126,224
 880 DATA 126,192,24,0,0,4,0,18
 890 DATA 0,18,1,18,1,42,17,168
 900 DATA 18,128,26,0,168,0,160,0
 910 DATA 255,255,255,255,255,255
 ,255,255
 920 DATA 255,255,182,30,250,129,
 0,38
 930 DATA 4,134,1,32,26,129,1,38
 940 DATA 4,134,2,32,18,129,2,38
 950 DATA 4,134,4,32,10,129,3,38
 960 DATA 4,134,6,32,2,134,8,187

HORSE SENSE



HORSE SENSE is a new approach to Thoroughbred handicapping. After purchasing many handicapping programs and getting few results, we figured there must be a better way. We believe we have found it! Makes sorting through the horses easy. We believe it is the best product on the market. If you tried the rest, now try the best! Watch for the RAINBOW REVIEW.

Disk or Cassette only **\$24.95**
 CoCo 1, 2 and 3



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97Ø DATA 3Ø,223,183,3Ø,223,189,2
 2,238
 98Ø DATA 57,189,28,244,193,Ø,38,
 28
 99Ø DATA 189,29,3,193,Ø,38,21,18
 1ØØØ DATA 18,18,18,18,18,18,188,
 3Ø
 1Ø1Ø DATA 251,34,5,134,3,167,164
 ,57
 1Ø2Ø DATA 134,1,167,164,57,189,2
 8,229
 1Ø3Ø DATA 193,Ø,38,28,189,29,3,1
 93
 1Ø4Ø DATA Ø,38,21,18,18,18,18,18
 1Ø5Ø DATA 18,18,188,3Ø,251,34,5,
 134
 1Ø6Ø DATA 2,167,164,57,134,Ø,167
 ,164
 1Ø7Ø DATA 57,189,28,244,193,Ø,38
 ,28
 1Ø8Ø DATA 189,29,18,193,Ø,38,21,
 18
 1Ø9Ø DATA 18,18,18,18,18,18,188,
 3Ø
 11ØØ DATA 251,34,5,134,1,167,164
 ,57
 111Ø DATA 134,3,167,164,57,189,2
 8,229
 112Ø DATA 193,Ø,38,28,189,29,18,
 193
 113Ø DATA Ø,38,21,18,18,18,18,18
 114Ø DATA 18,18,188,3Ø,251,34,5,
 134
 115Ø DATA 2,167,164,57,134,Ø,167
 ,164
 116Ø DATA 57,19Ø,31,6,16,142,31,
 44
 117Ø DATA 189,37,37,19Ø,31,8,16,
 142
 118Ø DATA 31,45,189,37,37,19Ø,31
 ,1Ø
 119Ø DATA 16,142,31,46,189,37,37
 ,19Ø
 12ØØ DATA 31,12,16,142,31,47,189
 ,37
 121Ø DATA 37,19Ø,31,14,16,142,31
 ,48
 122Ø DATA 189,37,37,19Ø,31,16,18
 9,21
 123Ø DATA 74,18,57,14Ø,43,224,37
 ,33
 124Ø DATA 166,164,129,Ø,38,4,189
 ,36
 125Ø DATA 91,57,129,1,38,4,189,3
 6
 126Ø DATA 127,57,129,2,38,4,189,
 36
 127Ø DATA 163,57,129,3,38,3,189,
 36
 128Ø DATA 199,57,182,31,54,129,Ø
 ,39

129Ø DATA 45,19Ø,3Ø,255,48,136,1
 58,188
 13ØØ DATA 3Ø,251,39,8,48,4,188,3
 Ø
 131Ø DATA 251,39,1,57,19Ø,3Ø,255
 ,189
 132Ø DATA 27,137,127,31,54,182,3
 Ø,25Ø
 133Ø DATA 139,1,187,3Ø,221,183,3
 Ø,221
 134Ø DATA 189,22,238,189,21,224,
 57,182
 135Ø DATA 3Ø,25Ø,198,2,61,142,42
 ,34
 136Ø DATA 48,139,16,142,36,14,95
 ,166
 137Ø DATA 16Ø,167,132,166,16Ø,16
 7,1,92
 138Ø DATA 193,1Ø,39,5,48,136,32,
 32
 139Ø DATA 238,57,182,31,55,129,Ø
 ,39
 14ØØ DATA 34,19Ø,3Ø,253,48,136,1
 58,188
 141Ø DATA 3Ø,251,39,8,48,4,188,3
 Ø
 142Ø DATA 251,39,1,57,19Ø,3Ø,253
 ,189
 143Ø DATA 27,137,127,31,55,189,3
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 144Ø DATA 189,21,174,57,182,31,5
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 145Ø DATA Ø,38,56,19Ø,31,2,48,13
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 146Ø DATA 95,188,3Ø,251,38,45,18
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 147Ø DATA 25Ø,76,129,5,39,29,183
 ,3Ø
 148Ø DATA 25Ø,189,24,112,189,25,
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 149Ø DATA 27,14,189,27,9Ø,134,24
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 15ØØ DATA 31,24,134,1,183,31,54,
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 151Ø DATA 31,55,57,126,17,148,12
 7,3Ø
 152Ø DATA 25Ø,32,222,57,19Ø,3Ø,2
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 153Ø DATA 172,164,39,16,48,1,172
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 154Ø DATA 39,1Ø,92,193,17,39,42,
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 155Ø DATA 136,31,32,236,19Ø,3Ø,2
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 156Ø DATA 27,112,189,21,24,189,2
 Ø,8Ø
 157Ø DATA 189,25,228,19Ø,3Ø,248,
 191,3Ø
 158Ø DATA 251,189,38,181,189,27,
 9Ø,182
 159Ø DATA 3Ø,237,74,183,3Ø,237,1

89,24
 1600 DATA 93,134,240,183,31,24,5
 7,57
 1610 DATA 16,142,31,6,189,38,14,
 16
 1620 DATA 142,31,8,189,38,14,16,
 142
 1630 DATA 31,10,189,38,14,16,142
 ,31
 1640 DATA 12,189,38,14,16,142,31
 ,14
 1650 DATA 189,38,14,16,142,31,16
 ,189
 1660 DATA 38,14,57,182,31,44,129
 ,5
 1670 DATA 39,36,182,31,45,129,5,
 39
 1680 DATA 29,182,31,46,129,5,39,
 22
 1690 DATA 182,31,47,129,5,39,15,
 182
 1700 DATA 31,48,129,5,39,8,182,3
 1
 1710 DATA 49,129,5,39,1,57,134,2
 55
 1720 DATA 198,20,16,142,0,2,189,
 23
 1730 DATA 51,57,255,189,24,112,1

82,31
 1740 DATA 54,129,1,38,19,182,30,
 250
 1750 DATA 198,20,61,142,35,50,48
 ,139
 1760 DATA 95,16,190,30,255,189,2
 7,35
 1770 DATA 182,31,55,129,1,38,11,
 142
 1780 DATA 36,14,16,190,30,253,95
 ,189
 1790 DATA 27,35,57,142,40,3,134,
 1
 1800 DATA 189,23,148,142,40,4,13
 4,16
 1810 DATA 189,23,148,142,40,5,13
 4,17
 1820 DATA 189,23,148,142,42,123,
 134,18
 1830 DATA 189,23,148,142,42,124,
 134,19
 1840 DATA 189,23,148,142,42,125,
 134,20
 1850 DATA 189,23,148,57,255,255,
 255,255
 1860 DATA 255,206,11,184,16,206,
 7,208
 1870 DATA 126,15,255,63

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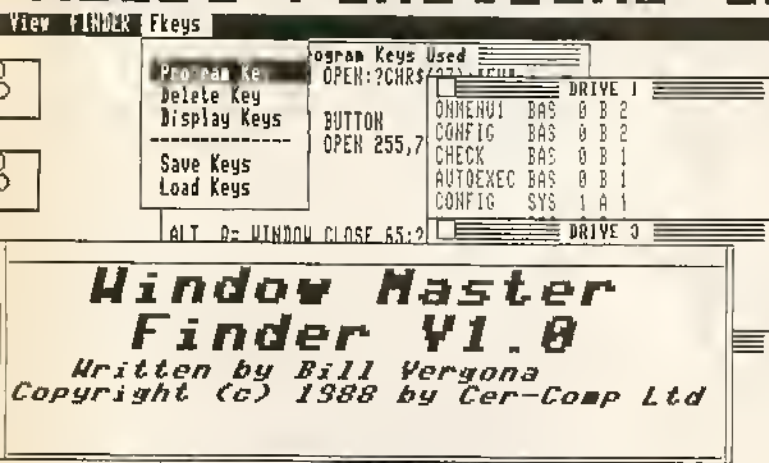
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Buttons, Icons, Edit fields or
Mouse Functions in your Programs!



Window Master Finder V1.0

Written by Bill Vergona
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Screen Display Fonts

Window Master supports up to 54 different character sizes on the screen with 5 different character styles. You can have Bold, Italic, Underlined, Super-Script, Sub-script or Plain character styles or any combination of them in any character size. You can also change the text color and background at any time to get really colorful displays.

Fully Basic Compatible

Window Master is fully compatible with Enhanced Color Disk basic with over 50 Commands & functions added to fully support the Point & Click Window System. Window Master does not take any memory away from Basic, so you still have all the Basic Program memory available.

Hi-Resolution Displays

Window Master uses the full potential of the Color Computer 3 display by using the 225 vertical resolution display modes instead of the 192 or 200 resolution modes like most other programs. It uses either the 320/16 color mode or the 640/4 color display to give you the best display resolution possible, and can be switched to either mode at any time.

Window Master Features

Multiple Windows

Window Master supports multiple window displays with up to a maximum of 31 windows on the screen. Overlapping windows are supported, and any window can be made active or brought to the top of the screen. Windows can be picked up and moved anywhere on the screen with the mouse. There are 6 different Window styles to choose from and the window text, border and background color is selectable.

Pull Down Menus

Menus are completely programmable with up to 16 menus available. They can be added or deleted at any time in a program. Menu items can be enabled, disabled, checked or cleared easily under program control. Menu selection is automatically handled by Window Master & all you have to do is read a function variable to find out which menu was selected.

Buttons, Icons & Edit Fields

Each Window can have up to 128 buttons, Icons or Edit fields active, if you can fit that many. Buttons, Icons and Edit field selection is handled automatically by Window Master when the mouse is clicked on one. All you have to do is read a Dialog function to find out which Button, Icon, or Edit field was selected, its very simple.

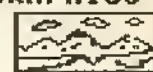
Mouse & Keyboard Functions

Window Master automatically handles the Mouse pointer movement, display and button clicks. It will tell you the current screen coordinate, the local window coordinate, window number the mouse is in, the number of times the button was pressed, which window number it was clicked in and more. The Keyboard is completely buffered, and supports up to 80 programmable Function keys that can contain any kind of information or command sequences you can imagine. You can load and save function key sets at any time. So, you can have special sets of function keys for different tasks. The "Ctrl" key is supported so that you have a full control code keyboard available.

CLEAR SCREEN
DOTS
BOX
CIRCLE
LINE
QUIT

16,1,00,1,0,3,2,0

WINDOW GRAPHICS DEMO
FOREGROUND
COLOR



LOAD
SAVE

PHICS DEMO
IONS", "CLEAR SCR
", "CIRCLE", "LINE
LOAD", "SAVE"

30 WINDOW OPEN 1,44,16,1,00,1,0,
3,2,0,"WINDOW GRAPHICS DEMO"
40 MW=1: MY WINDOW #=1
50 ON MENU GOSUB 540
70 MENU ON
80 PROTECT 3
90 ON DIALOG GOSUB 630: DIALOG 0
N

hello

BREAK
OK
RUN

ENTER FILE TO SAVE

SAVE FILE

GFXTEST.PIC:2

Mixed Text & Graphics

Window Master fully supports both Text & Graphics displays and even has a Graphics Pen that can be used with HLINE, HCIRCLE, HSET and more. You can change the Pen width & depth and turn it on or off with simple commands. We also added Enhanced Graphics Attributes that allow graphics statements to use And, Or, Xor and Copy modes to display graphic information. With the Graphics enhancements added by Window Master, you could write a "COCOMAX" type program in Basic! In fact we provide a small graphics demo program written in Basic.

Event Processing

Window Master adds a powerful new programming feature to Basic that enables you to do "Real Time" Programming in Basic. It's called Event Trapping, and it allows a program to detect and respond to certain "events" as they occur. You can trap Dialog activity, Time passage, Menu Selections, Keyboard activity and Mouse Activity with simple On GOSUB statements, and when the specified event occurs, program control is automatically routed to the event handling routine, just like a Basic GOSUB. After servicing the event, the sub-routine executes a Return statement and the program resumes execution at the statement where the event occurred.

Enhanced Editing Features

Window Master adds an enhanced editor to Basic that allows you to see what you edit. It allows you to insert & delete by character or word, move left or right a word or character at a time, move to begin or end of line, toggle automatic insert on/off or just type over to replace characters. The editor can also recall the last line entered or edited with a single key stroke. You can even change the line number in line to copy it to a new location in the program.

Window Master Applications

Window Master pushes the Color Computer 3 far beyond its normal capabilities, into the world of a "User Friendly" operating environment. We are already planning several new programs for use with Window Master. So you don't have to worry about having to write all your own programs. And don't forget that many existing Basic and M.L. programs will run under Window Master with little or no changes. The Possibilities for Application programs are endless: Spread Sheets, Word Processing, Communications, Education, Games, Graphic Design, Desk Top Publishing and on and on.

Hardware Requirements

Window Master requires 512K of memory, at least 1 Disk Drive, a Hi-Res Joystick Interface and a Mouse or Joystick.

Technical Assistance

If you run into difficulty trying to use some of Window Master's features, we will be happy to assist you in any way possible. You can write to us at the address below or call us between 10am and 2pm Pacific Standard Time for a more timely response. Sorry, no collect calls will be accepted.

Ordering Information

To order WINDOW MASTER by mail, send check or money order for \$69.95, plus \$3.00 for shipping & handling to the address below. To order by VISA, MASTERCARD or COD call us at (702)-452-0632 (Monday thru Saturday, 8am to 5pm PST)

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CALENDER V 2.0
May 1988

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2	3	4	5	6	7
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14	15	16	17	18	19
20	21	22	23	24	25
26	27	28	29	30	31

Call for availability of 128K version!

NOVICES NICHE

THE RAINBOW is a teaching environment and we realize that the majority of our readers will always be beginners. In our continuing effort to always keep the new user in mind, and in addition to the many beginner feature articles and programs published in every issue, "Novices Niche" contains shorter BASIC program listings that entertain as well as help the new user gain expertise in all aspects of the Color Computer: graphics, music, games, utilities, education, programming, etc.

Cryptologist's Sidekick

By Donald Kylo

16K
ECB

When I started working on the encrypted message in the Cryptogram Contest, I took out a piece of paper and began using substitution. Then it occurred to me that I could write a program that would do this automatically — thus *CryptAid* was born. Just run the program and type in the coded message.

CryptAid creates a series of blanks, which will be filled in as you try different letter combinations. It asks you to enter an encoded letter and then the letter you think the encoded letter is substituting for. For example, if the encoded message is MPTYJ NU MPTYJERDY, the program creates this: ----- Then it asks you to "give code letter." You might start with the first code letter, M. The program would then ask you to give it a substitute letter — try N. The letter N would then show up in every occurrence of the letter M: N----- N-----.

If you change your mind about that substitution, you can try another letter for M. (N is the correct substitution for M, by the way. This three-word cryptogram is a movie title.) Continue substituting letters until you decode the message. You'll find that solving a cryptogram on computer is a lot easier than solving one on paper.

The listing: CRYPTAID

```
10 CLEAR1000
20 C$=" !"+CHR$(34)+"#$$%&'()*+,-
./0123456789:;<=>?@"+STRING$(26,
"-")
30 PRINT"TYPE IN CODED MESSAGE"
40 LINEINPUTB$
50 CLS:PRINTB$
60 FORI=1TOLEN(B$)
70 PRINTMID$(C$,ASC(MID$(B$,I,1)
)-31,1);
80 NEXT
90 PRINT
100 INPUT"GIVE CODE LETTER";C1$
110 INPUT"GIVE REPLACEMENT LETTE
R";C2$
120 MID$(C$,ASC(C1$)-31,1)=C2$
130 GOTO50
```

Novices Niche Addendum

Cryptogram Contest Results

The solution to the cryptogram contest that appeared in the April '88 issue is as follows:

Follow THE RAINBOW to a CoCo "pot of gold." THE RAINBOW is the only magazine just for your Tandy CoCo 1, 2 and 3 and will meet your computing needs for business and pleasure. Be sure to tune in next month for our printer issue.

The notice read, "In case of a tie, we will hold a drawing." What an understatement! We had a 585-way tie. Any Trekkie will know what we mean when we say we had "Tribble" trouble. The responses never stopped multiply-

ing! Lonnie Falk did the honors of wading into the sea of entries and netting the winner — and that winner is Richard Osborne of Niekelsville, Virginia. Congratulations, Richard, on winning *The Third Rainbow Book of Adventures* and its companion disk! The rest of you entrants take heart — more contests (more difficult ones, too) are coming your way. We wish we could give every successful cryptologist a copy of the *Adventures* book, but we can't, so we're offering the consolation of seeing your name in print (as promised in the May issue, *before* we knew we'd get 585 entries — but, hey, we keep our promises!):

Betty Abrecht, Elmore, SC; Jon Adamowicz, Paramus, NJ; Bill Adams, Pasadena, TX; Robert Adams, West Lawn, PA; Ellen Altman, Millard, CT; Roselyn Aguirre, Los Angeles, CA; M. Allastun, Tracy, Quebec; Leon Albin, Glen Echo, MD; Warren Albright, Grand Rapids, MI; Frank Allen, Arkadelphia, AR; Robbie Allen, Charlestown, NH; Tummy Allen, Jr., Anderson, SC; Jeffrey Allmon, Pocomoke, ID; Kathleen Alton, Madera, CA; John Anderson, Baton Rouge, LA; Sarah Alhart, Mason City, IA; Dean Arnall, Uvalde, TX; Mike Arvan, Youngstown, OH; Hyman Ayris, Baldwin, MI; Sol Azat, N. Massapequa, NY; Tom Bair, Boring, OR; Eugene Baker, Germantown, B.C.; Jeff Baker, Penderville, MI; Frank Baldwin, Jr., Decatur Hill, PA; Tom Balra, Bolton, MA; Gilbert Bari, Austin, TX; John Bartlett, Pensacola, FL; Donna Bartley, Carroll, CA; Margaret Barthel, Clifton Park, NJ; William Batten, Pittsburg, KS; Keith Bauer, Menominee, MI; Robert Braxley, Ft. Lupton, CO; Clem Beland, Victoria, BC; Gary Beeley, Tucker, GA; Daniel Belmann, Napoleon, OH; Robert Benton, Niceville, FL; Chris Bergman, Getzville, NY; Steven Herman, Encino, CA; Ray Berney, Okanogan, WA; Karl Bryer, Macon, IL; Conrad Billie, Louisville, KY; Paul Bisnett, Sackets Harbor, NY; Ivan Blackwell, P.B. Blackwell, Denton, IL; Edward Blend, Jr., Victorville, CA; Martin Bohn, Carpenterville, IL; David Buntin, Marietta, GA; Tony Boring, Armagh, PA; Gaston Busse, Montreal, Quebec; Eric Bower, Ossian, IN; Greg Bynka, Inverness, CA; Walter Bowman, Radcliff, KY; Mark Boyd, Warner, Rhode, GA; Pat Brands, Chatsworth, CA; Richard Bresnahan, Lenox, MA; Emil Britter, Philadelphia, PA; Alfred Bruna, Rutin, WI; Charles Brown, Columbus, TN; Philip Brown, San Rafael, CA; James Bruce, Ackerman, MS; Robert Build, Oak Park, IL; Maria Bryson, Woodstock, GA; Jason Bucatu, Ferndale, MI; Christopher Buchanan, Minna, IL; Harry Buchanan, Marou, IL; Tracy Buchanan, Minna, IL; John Brilind, Madison, FL; Carl Burgess,

Washington, D.C.; Ron and Nancy Burgin; William Bushby, Hershey, PA; Kenneth Byram, Ft. Knox, KY; Christi Cadek, Ingleside, IL; Adam Caldwell, Middlefield, OH; Gloria Camarda, Mamaroneck, NY; Jerome Camarda, Mamaroneck, NY; Don Campbell, Helton, SC; Lawrence Carboni, Floral Park, NY; Lou Cass, Sehrling, FL; Randy Cassel, Middletown, PA; Glenn Chagnot, Tolland, CT; Wellie Chao, Tampa, FL; Lee Chapel, Springfield, IL; Brian Chase, North Ft. Lauderdale, FL; Robin M. Cheeseman, Middletown, DE; John Clemons, Bland, VA; Bill Cleveland, Hamlet, NC; C.C. Colley, Gautier, MS; Paul Cole, Lynn, MA; Barbara Collins, Moorestown, NJ; David Compton, Sulfield, CT; Aland Coons, Roseburg, OR; Norman Coons, Wabash, IN; Robert Corbett, Schuyler Falls, NY; Paul Cords, Cairo, NY; Lee Crandell, Duarte, CA; Dan Crosby, Eagle, ID; William Cross, Warren, OH; Worthy Cumberland, Philadelphia, PA; Arthur Cummings, Athol, MA; Vail Cummings, Beachwood, OH; Ted Curtis, E. Holden, ME; Chris Cuthill, York, Ont.; Anthony Crapacki, Glen Lyon, PA; H.A. Dailey, Columbus, OH; Charles Dale, Lancaster, PA; Lois Daly, Madison, FL; Thomas Daly, Wauegan, IL; Don Davidson, Berton, OH; Norman Davies, Hendersonville, NC; Joe Davignon, N. Augusta, SC; Billy Davis, O'Fallon, IL; Tim Davis, Schaumburg, IL; Darren Day, Whitesburg, KY; Adolph Degastano, Ft. Lauderdale, FL; Andy DePue, Climax, MI; Lee Deuell, Shell Rock, IA; Joel DeYoung, Manson, Manitoba; Bruce Dinger, St. Paul, MN; Jill Dingess, Chapmanville, WV; Brent Dingle, Norwalk, IA; Jim Dittom, Thermal, CA; Jack Doherty, Dallas, OR; Leslie Donaldson, Poplarville, MS; O.L. Douthitt, Mineola, TX; Louis Draucker, Jr., Seaford, DE; Richard Dostater, Warner Robins, GA; Chris Dunham, Portsmouth, OH; William Dwyer, Salisbury, NE; Jeremy Echols, Tucson, AZ; Eugene Eck, Jr., South Williamsport, PA; John Eckertson III, APO NY; Kevin Efram, Ramsey, MN; Donald Eisenharth, Corbin, KY; Peter Ellis, Evanston, IL; Tim Ellisworth, Bramalea, Ont.; Robert Emmett, St. Catharines, Ont.; Michael Emory, Campobello, SC; Roger Emory, Groton, CT; Vivian Ernberger, New Bern, NC; Jo Ernst, APO NY; Jamie Estill, Augusta, KY; Tom Evans, McKees Rocks, PA; Dean Fadden, N. Vernon, IN; Steve Fahy, North Haven, CT; Steve Farwell, Giddings, TX; R. Fastersham, Manjotah, Gene Fillius, Gulfport, MS; Fred Findley, Orlando, FL; Steve Flock, Spokane, WA; Bill Flowers, Westerville, OH; Peggy Flowers, Westerville, OH; Shane Foret, Lockport, IL; Herb Forster, Norwalk, CT; Jim Forster, Medina, OH; Joe Forster, Howard, OH; Lewis Fortwangler, Connelville, PA; Stan Fox, Danielson, CT; Bill T.J. Fraley, Freeport, TX; Frankan, San Bernardino, CA; Fannie French-Holt, Ilenon, KY; Ivan Freyman, Brooklyn, NY; Burton Fry, Floral City, FL; Rita Gabriel, Mansfield, OH; Chris Gallagher, Chino, CA; Gerald Galland, Sea, WA; Nelinda Garhach, Spring Hill, FL; Harold Gardin, Jr., Mt. Holly, NJ; Richard Gehl, Fremont, CA; Alvin Gellert, Chantall, PA; Mike Gerns, Kamloops, BC; A.F. Gibson, Vinton, OH; Frank Gibson, Hampton, NB; Gary Giles, Virginia Beach, VA; Scottie Gilliam, Tracy, CA; Tim Gilliland, Hixson, TN; Greg Gingerich, Lyndhurst, VA; Joel Glaser, Spalding, NE; Robert Glass, Vinton, VA; Virgie Goen, Medora, IN; Calvin Goodwin, Thomaston, CT; George Grabel, New London, CT; Herbert Greenberg, N. Miami, FL; Bobby Greene, Jr., Lenoir, NC; Frederick Greene, Rogers City, MI; Jay Greenwood, Crystal Springs, MS; Alice Griffin, Carlede, GA; John Grubb, Gallipolis, OH; Leroy Guse, Greenleaf, WI; John Groz, Peshody, MA; Truman Gustafson, Terryville, CT; Tom Guyette, Manchester, NH; Alex Hahn, Montclair, NJ; David Hall, Jacksonville, FL; Greg Hall, Columbus, NE; Jeffery Hall, Newport, MI; Stephen Hallin, Bilexi, MS; Larry Harris, Flemington, NJ; Robert Hart, Boynton, FL; Aaron Hartzler, Brent Heaton, Anderson, SC; Thomas Hensel, Glastonbury, CT; Dale Herbert, Camrose, AB; B.J. Hellmons, Scott Henderson, Jacksonville, FL; Sam Herrin, Reece, AR; Andrew Hildreth, Bryan Hill, Crawfordsville, IN; Daniel Hill, Seven Springs, NC; Edward Hill, Brantford, Ont.; Jim Hillwig, Herold, TX; Ron Hinton, East Liverpool, OH; Myron Hobilz, Weimar, TX; Jon Hobson, Plainfield, WI; Jacob Hoekstra, Drayton, Ont.; David Hollar, Kingfisher, OK; Scott Hopman, Houston, TX; Gary Hough, Stephens City, VA; Beatrice Hunt, Ashland, OH; Doug Hoyt, Stockton, CA; Jim Hrubik, Norron, OH; Dale Hubbard, Lynn, MA; Wayne Hulford, Kincardine, Ont.; Charles Hulen, Lawrenceburg, TN; Levi Hunt, Baltimore, MD; Malcolm Inglis, Ottawa, Ont.; John Ivory, Scarborough, Ont.; Steven Jacobowitz, Bronx, NY; Louise James, Chattanooga, TN; James Jones, Fort Ann, NY; A.L. Johnson, Clearwater, FL; Don Johnson, Florissant, MO; Neil Johnson, Walnut Creek, CA; Roberta Johnson, Clover, SC; William Johnson, Petersburg, VA; Patrick Jolly, Carson City, NV; Kathy Jones, Pittspond, MI; David Joseph, Veda Jury, Greenville, SC; Joe Justman, Holbrook, AZ;

Daniel Kaminsky, San Francisco, CA; Derriek Kardos, Colonia, NJ; Susan Karnesky, Richland, WA; Timothy Kaylor, Cape Canaveral, FL; Peter Kazair, Plaquemine, LA; James Kelly, Woodbury, NJ; Daniel Kennedy, S. Burlington, VT; Robert Kepp, Littleton, CO; Johnie Kilgore, Lynchburg, VA; Bill Kimbler, Ironton, MN; Clark King, Tulsa, OK; Thomas Kokorek, Emerson, GA; Mark Koester, Lugan Lake, BC; Wayne Kopke, Glendale Heights, IL; Rory Kostman, Hershey, NE; William Knight, Irma, SC; Roy Knell, Llan, IL; Terry Kreizl, Largo, FL; Clay Kunz, Colorado Springs, CO; Donald Kylo, College Place, WA; Frank Lamondic, Groton, NY; Josh Langley, McLean, IL; Curt Lawson, Chattanooga, TN; Jeff Lawrence, Cambridge, Ont.; Thomas Lawrence, Middlesex, NJ; Andrew Leary, N. Stonington, CT; Denise Lelliane, Grande-Digue, NL; Dave Ledson, North Bay, Ont.; Rick Lee, Bangor, ME; Dale Leiston and family, Lompoc, CA; Austin Leo, Skillman, NJ; Judy Leo, Skillman, NJ; Marius Lemire, Montreal-Nord, Quebec; Barbara Lethbridge, Cartwright, NFD; Harnie Lickieig, Millard, CT; Jeffrey Linder, Lake Carmar, NY; Timothy Lindow, Coosa, FL; Kimberly Lindquist, Eugene, OR; Ivan Litt, Woodstock, Ont.; Clyde Lloyd, Springfield, MO; Larry Lloyd, Jamestown, CA; Gregory Long, Walnut Creek, CA; Randy Longshore, Chesterfield, MO; Carsten Lasse, Jersey City, NJ; John II. Lowry, Jr., Jell Lucas; Mike Lyness, Eglin AFB, FL; David MacGarvia, Blairmore, AB; Wm. T.C. Maine, Rind River, Ont.; Brian Mangin; Robert Manning, Phoenix, AZ; William Manning, Tracy, Quebec; Maurice Marion, Delta, I.C.; Stephen Marlow, San Marcos, TX; Marco Marrero, Arroyo, PR; Kevin Marsh; John Marshall, Willis, CA; Laura Marshall, Surrey, BC; Shuman Martin, Chester, IL; Herbert Masch, Melbourne, FL; Jason Matheny, Louisville, KY; Roger Maxwell, Kilgore, TX; Wilher Maxwell, Carlisle, PA; Tom McArthur, Lindenhurst, NY; Mike McCanney, Camden, NY; Shawn McCarthy, Hurke, VA; Eric McClaren, Lincoln Park, MI; Theresa McCollor, Altoona, PA; Robert McCoy III, Elkon, VA; James McDonald, Roselle Park, NJ; Colin McKay, Gloucester, Ont.; Robert McKean, Panama, NY; John McMasters, Jackson, MO; A.J. McNabb, Orange, TX; M.S. McPherson, Dallas, TX; Ronald McQueen, Decatur, IL; Pat McWhinney, Key Largo, FL; Billie McWilliams, Falling Water, WV; Walter Medak, Edmonton, AB; Jason Medd, Hie. Breton, NE; George Meissner, Islip, NY; Frederick Merrin, Gilsolia, PA; David Meyer, Wyoming, MI; Laura Michaels, Arlington, TX; Esther Millard, Camden, NC; Merle Miller, Albuquerque, NM; Richard Miller, Knox, IN; Louis Mills, Summerville, NJ; Harvey Minner, Wilmington, DE; Hoh Mischler, Glendale Heights, IL; Renita Mischler, Addison, IL; Matt Moaks; James Moccia, Boston, MA; Jason Monds, Cantonment, FL; Thomas Montgomery, Portsmouth, VA; D.E. Moore, Mustang, OK; R.W. Morris, Izora, Australia; David Morrison, Brewster, ME; Brenda Moseley, Sanford, ME; Dureas Moseley, Winter Park, FL; Lilly Moss, Hyde Park, MA; Thomas Mott, Poway, CA; Charles Muisener, Newington, CT; John Muxamei, Ozona Park, NY; Sue Myers, Flimhurst, IL; Paul Nyles, Coraopolis, PA; Raymond Naquin, Marrero, LA; Joseph Nash, Jr., St. Louis County, MS; Jon Nedelja, New Hartford, CT; Andre Needham, Renton, WA; C.W. Needham, Sherman, TX; Tina Nell, Willow Street, PA; Cliff Nelson, St. Charles, MO; Kent Nelson, Clinton, CO; John Neuhaus, Pueblo, CO; Christopher Newby, Lexington, IL; Louis Nickens, Brooklyn, NY; Terry Nicoulin, Naples, FL; Charles Nolan, Van Buren, AR; W.C. Northingham, Englewood, FL; James Novak, Chicago, IL; Chris Nuwer, Lockport, NY; Scott Oaks, Old Town, ME; Sean Oberer, Huber Heights, OH; Eddie Olferman, Orlando, FL; Dale Olshchuk, Hollister, CA; Hank Oben, Northglenn, CO; Henry Ostrachuk, Willowdale, Ont.; Pam Osmun, Osseo, MI; Ken Ostrer, Vancouver, WA; Barbara Ower, Pasadena, CA; Neil Edward Parks, Beachwood, OH; Mike Partidge, Comstock Park, MI; Brett Patrick, Shalotte, NC; Leslie Patrick, Junction City, KS; Jim Perkins, Curran, Ont.; Wesley Perkins, Austin, TX; Alan Peterson, Brooklyn Park, MN; Pamela Peterson, Adamstown Heights, Australia; Ora Pettit, Wilson, NY; Troy Phelps, Baraboo, WI; Dale Phillips, Schreton Lake, NY; Dean Phillips, Jr., Richmond, VA; Matthew Piechota, Green Bay, WI; Charles Pier, Perryburg, OH; Ralph Pike, Kalamazoo, MI; Rodger Pille, Cincinnati, OH; Penny Pittenger, Long Beach, CA; Larry Pittman, Fenton, MI; Dennis Poffenberger, Ames, IA; Suzanne Poirier, Lachine, Quebec; Ed Porter, Cherry Hill, NJ; Shawn Porter, Carigill, Ont.; James Posparelis, Troy, NY; Milt Poules, Round Brook, NJ; Eduardo Prado, Jr., Sao Paulo, Brazil; Katly Puckett, Eva, AL; Walter Pullen, Kent, WA; Don Quilks, Seattle, WA; Rod Quibell, Pefferlaw, Ont.; Tony Rademaker, Burlington, Ont.; Doug Raggett, Galveston, TX; Anthony Rapson, Tulsa, OK; Jeanne Rayner, Ford, WA; Eli Rarey, Santa Rosa, CA; Gary Rees, Jackson, MI; Steve

Reeves, Phoenix, AZ; Richard Reid, Boucherville, Quebec; Mark Reiter, Cincinnati, OH; Tom Remakel, Dubuque, IA; Jell Renick, Warren, MI; Ian Renaud, Rasimere, Quebec; Brandon Rhodes, Andover, MA; Thomas Riley, Johnsonville, NY; Richard Robert, Ile Perrot, Quebec; Ronald Roberts, Brandon, WI; Andrew Robinson, Pleasant Mount, PA; Larry Robinson, Bloomington, IN; Richard Robinson, Colorado Springs, CO; James Rogers, Potomac, MD; Ken Rogers, Leamington, Ont.; Linda Rodman, Anchorage, AK; Marjorie Rose, Johnson City, TN; David Ross, Aurora, IL; Stan Ross, Alma, AR; Raul Rossy, Bogueron, PR; Reina Roy, Carleton, Quebec; Sheila Royal, Shelbyville, IN; Chinarru Ruzangchotai, Ramsey, NJ; Jean Rud, Blument, VA; Kathy Rumpel, Arcadia, WI; RJ Russel, London, KY; James Ruth, Neward, NH; Jerry Ryan, Little Rock, AR; Nicole Sauriol, Laval, Quebec; H.J. Schimmellenaig, West Vancouver, BC; Rich Schmitz, Sioux City, IA; Fred Schubert, Cairo, IL; John Schulz, Merritt Island, FL; David Schwarzen, Festus, MO; Joseph Scinta, Jr., Tonawanda, NY; Merrill Scott, Methany, OK; Ron Scott; Robert Seabridge, Reno, NV; Ivan Sealey, Nassau, Bahamas; Anthony Sears, Spartanburg, SC; Emory Secosky, Gbg., PA; Chris Serino, Columbia, MO; Richard Seyfried, Salem, NJ; John Shannon, Albion, NJ; Tom Shauill, Littleton, CO; Mike Shay, Lebanon, PA; Margaret Shively, Westerville, OH; Bernice Shooks, Clinton, NJ; H.P. Sinaert, Roseburg, OR; Mike Sipes, Escandido, CA; Tony Skrabia, McKees Rocks, PA; Colin Smek, Lakewood, OH; Albert Smith, Durham, NC; Colin Smith, Ada, OK; Heather Smith, Queensland, Australia; Kirby Smith, York, PA; Michael Smith, LaMarque, TX; Roger Smith, Peabody, MA; Diane Snider, Westerville, OH; Queen Snider, Cambridge, OH; Allen Snook, Dixon Hdt, MI; Don Soehngen, Florissant, MO; Allen Solid, Montevideo, MN; Jell Stall, Naperville, IL; Willis Stanley, Bowie, MD; Terry Steen, Langley AFB, VA; Robert Steeves, Toronto, Ont.; Terry Stellen, Tostoria, OH; Bree Stegman, Orleans, Ont.; Vickie Stepp, Huber Heights, OH; Harry Stern, Miami, FL; Bruce Stevens, Rochester, NH; David Stewart, Kent, OH; Fred Stewart, Camdenton, MO; Brian Stewing, West Haven, CT; Curt Stout, Sumner, VA; Ken Stranger, Coeur d'Alene, ID; Werner Streidt, Bonn, West Germany; Scott Stuart, Walnut Creek, CA; Brenda Stump, Laureldale, PA; Aaron Sumner, Godfrey, IL; Ray Sumral, West Monroe, CA; Lloyd Sundersky, Port Lavaca, TX; Iah Swalen; Johnni Swain, Imperial, CA; Wally Swain, Ottawa, Ont.; Russell Sweet, Blue Ridge, GA; John Tansy, New Market, AL; Adam Tate, Baton Rouge, LA; Jack Taylor, Palm Bay, FL; Phil Taylor, Corbin, KY; Richard Taylor, Toms River, NJ; Stephen Terry, Chapel Hill, NC; Richard Testrake, Erie, PA; Eric Thompson, Cape Girardeau, MO; William Thompson, Woodbridge, VA; Robert Thorpe, Cedar Rapids, IA; Donald Todd, Vallejo, CA; Rita Tidwell, Granbury, TX; Ben Tiller, Trois-Rivieres, Quebec; John Tindall, Plainboro, NJ; Phillip Tkachuk, Edmonston, AR; Chris Trotter, Esconah, MI; Michael Toepeke, Oak Harbor, WA; Dorothy Topping, Okeechobee, FL; Bill Torrence, O'Fallon, MO; Donald Turowski, Natrona Heights, PA; Spencer Twayman, Mt. Clemens, MI; John Valentine, Marlborough, CT; Wally Vance, Meridian, MA; H.D. Vaughn, Virginia Beach, VA; W.E. Veenschoten, Birmingham, AL; Donald Villard, Starkville, MS; Greg Vincent, Orilla, Ont.; Michael Vogt, Hayes, VA; Kyle von Talge, St. Louis, MO; J.R. Waggoner, Stuttgart, AR; Beth Walker, Flint, TX; Mathys Walms, Paisley, Ont.; John Wanless, Ridgeway, Ont.; James Ward, Canton, OH; Ann Warick, Chesilhurst, NJ; Nancy Washer, Midwest City, OK; Daniel Weaver, Amsterdam, NY; Jeremiah Weeks, Collegedale, TN; Bruce Wehner, Portsmouth, NH; Ken Weiland, North Plainfield, NJ; Max Weinstein, Flemington, NJ; Bruce Wells, Madison, WI; Robert Wells, Meriden, CT; Terrence Werth, Victoria, KS; Paul Wheelock, Mingo, IA; K. Whitesell, Waterloo, IA; Duane Whitlock, North East, MD; John and Reed Wiedower, Winchester, VA; Joseph Wummers, Asheville, NC; Roger Wilkins, Sexsmith, AB; Barbara Williams, Swayzee, IN; Barry William, Tallahassee, FL; Brian Wilwerth, Hingham, MA; Geatrey Wilson, Iroquois, Ont.; Nedra Wilson, Rifle, CO; Chuck Wiltgen; Gerald Winans, Matamoras, PA; Darnell Windham, Flint, MI; Richard Winkelhauser, Bronx, NY; Matt Winright, Eaton Rapids, MI; Fred Wise, Clarion, PA; Sent Wisely, Beaton, AK; Dave Wissell, Victoria, BC; George Witruke, Olean, NY; Paul Wolf, Hanover, PA; Edward Wollie, Ridgewood, KY; Thomas Wong, Red Deer, AB; P.W. Wood, Laval, Quebec; Mark Woods, Batavia, IL; Colleen Woodward, North Cape May, NJ; Mark Woodrudge, Milwaukee, WI; Dan Wyranowski, Mineral Springs, NC; Raymond Wynn, Leola, PA; Curtis Young, Ashland, OH; Harold Yost, Garden Grove, CA; Dan Yowell, Lincoln, NE; Daniel Zacharias, Leighton, PA; Martha Zehley, Uniontown, PA; Deborah Zeidler, Bridgeport, MI.

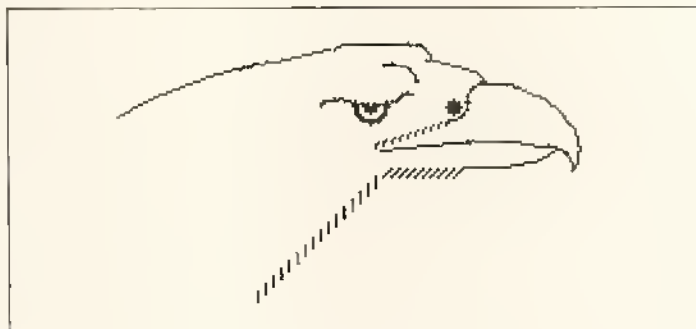
Here Eagles Dare

By Steve Caldwell

16K
ECB

Display your patriotism with this short program, which draws an American eagle on the PMODE 4 screen. *From Steve Caldwell, Stonewall Ent., P.O. Box 9357, Canton, OH 44711.*

The listing: EAGLE



```
10 PMODE4,1:SCREEN1,1:PCLS(1)
20 CIRCLE(128,96),7,2,1,.95,.55:
CIRCLE(128,96),3,2,1,.999,.50:CI
RCLE(128,96),6,2,1,.98,.53:CIRCL
E(128,88),16,2,.5,.15,.40:PAINT(
128,97),2,2:CIRCLE(114,96),6,2,.
5,.55,.80:CIRCLE(142,93),4,2,.8,
.50,.85
30 CIRCLE(170,112),38,2,.7,.75,.
05:CIRCLE(196,120),10,2,1,.75,.9
99:CIRCLE(176,120),30,2,.4,.70,.
87:LINE(169,109)-(132,113),PRESE
T:CIRCLE(172,108),30,2,.4,.07,.3
0
40 CIRCLE(172,94),8,2,1,.50,.83:
CIRCLE(158,94),8,2,1,.99,.25:CIR
CLE(160,96),3,2:PAINT(160,96),2,
```

```
2
50 CIRCLE(146,105),40,2,.7,.78,.
87:CIRCLE(142,78),10,2,.77,.70,.
0:CIRCLE(136,86),10,2,.77,.70,.0
60 LINE(138,72)-(120,72),PRESET:
CIRCLE(120,80),10,2,.9,.65,.75:C
IRCLE(180,140),180,2,.4,.60,.70
70 FORX=163TO136STEP-3:LINE(X,12
0)-(X-3,123),PRESET:NEXT:X=130:F
ORY=123TO170STEP3:LINE(X,Y)-(X,Y
+4),PRESET:X=X-3:NEXT
80 X=158:FOR Y=101TO111STEP1.1:LI
NE(X,Y)-(X-1,Y+2),PRESET:X=X-3:N
EXT
200 GOTO200
```

Utilities

ML Addresses

By Bill Bernico

16K
Disk

This program scans a disk directory for ML files and lists only these files and their start, end and EXEC addresses. The program is self-explanatory and will work on a CoCo 2 or CoCo 3 in 32, 40 or 80 columns.

The listing: SCRNLIST

```
1 CLEAR1500:DIMZ(68):H$="####":
CLS:PRINT"INSERT DISK AND HIT AN
Y KEY FOR START, END & EXEC ADD
RESSES OF BINARY FILES":EXEC445
39:CLS:PRINT"FILENAME/EXT START
END EXEC":PRINT:DSKIS$,17,2,
A$,B$
2 G$=LEFT$(A$,68):FORI=1TO68:Z(I
-1)=ASC(MID$(G$,I,1)):NEXTI:FORX
```

```
=3TO11:DSKIS$,17,X,AA$,BB$:AA$=A
A$+LEFT$(BB$,120):FORN=0TO7:F$=M
ID$(AA$,N*32+1,8):E$=MID$(AA$,N*
32+9,3):Z=ASC(MID$(AA$,N*32+14,1
)):Y=Z:C$=MID$(AA$,N*32+12,1):D$
=MID$(AA$,N*32+13,1)
3 IFLEFT$(F$,1)=CHR$(0)THEN9
4 IFLEFT$(F$,1)=CHR$(255)THEN10
5 W=ASC(D$)AND 1:FORI=1TO68
6 IFZ(Z)<128THENZ=Z(Z):NEXTI
7 GOTO11
8 IFASC(C$)=2THENPRINTF$;" /BIN
";:PRINTUSINGH$;V;:PRINT",";:PRI
NTUSINGH$;U;:PRINT",";:PRINTUSIN
GH$;T
9 NEXTN,X
10 PRINT:END
11 LG=Z(Z):S=LG AND 31:R=Z:Q=ASC
(MID$(AA$,N*32+16,1))
12 IFY<34THENP=INT(Y/2)ELSEP=INT
(Y/2)+1
```



```

13 M=1+(Y AND 1)*9:DSKI$Ø,P,M,A$
,B$:V=ASC(MID$(A$,4,1))*256+ASC(
MID$(A$,5,1))
14 U=V+ASC(MID$(A$,2,1))*256+ASC
(MID$(A$,3,1))-1
15 IFR<34THENP=INT(R/2)ELSEP=INT

```

```

(R/2)+1
16 M=(R AND 1)*9+S:DSKI$Ø,P,M,A$
,B$:A$=A$+LEFT$(B$,127):T=ASC(MI
D$(A$,Q-1,1))*256+ASC(MID$(A$,Q,
1)):GOTO8

```

CoCo 3 Green Screen Blues

CoCo 3

By Charles F. Phillips

Picture this: After months of anticipation I finally bought a CoCo 3, connected it to my green screen monochrome monitor (I couldn't yet justify the price of a CM-8 to my wife), powered up and saw . . . a screen full of garbage! To those of you who use a color monitor adapter with your CoCo 2, this would be no surprise. To those of us who use a monochrome adapter, this is a near-fatal shock!

To make life with CoCo 3 and a monochrome monitor more bearable, I borrowed some hints and pokes from THE RAINBOW and wrote this menu-driven program. *Mono3* kills the color burst and sets the PALETTEs to a white foreground with black background.

The menu gives you seven options, allowing you to set your screen to black on green or green on black in 32, 40 or 80 columns. Lines 40 through 110 provide the menu; lines 120 through 190 are a keyboard input routine. Lines 230 through 280 set the width, kill the color burst, set the PALETTEs and go to the main menu so that you can try out all the options. Option 7, End Program, clears the menu from the screen and wipes the memory to prevent interference with the next program. Just break out of the program if you want to leave the settings in effect.

If the 80-column, green on black option looks strange, try increasing the brightness a bit. If you have an amber monitor, simply edit lines 50 through 100, swapping the word amber for green.

The listing: MONO3

```

5 ' MONOCHROME COCO3
1Ø ' BY CHARLES F. PHILLIPS
15 ' 11 GASTON PLACE
2Ø ' HAVELOCK, N.C. 28532
25 '

```

```

3Ø WIDTH32:POKE&HEØ33,16:PALETTE
12,63:PALETTE13,Ø:CLS
4Ø PRINT:PRINT" SELECT A STYLE
OF DISPLAY"
5Ø PRINT:PRINT"1. 32 COLUMNS, GR
EEN ON BLACK"
6Ø PRINT"2. 32 COLUMNS, BLACK ON
GREEN"
7Ø PRINT"3. 4Ø COLUMNS, GREEN ON
BLACK"
8Ø PRINT"4. 4Ø COLUMNS, BLACK ON
GREEN"
9Ø PRINT"5. 8Ø COLUMNS, GREEN ON
BLACK"
1ØØ PRINT"6. 8Ø COLUMNS, BLACK O
N GREEN"
11Ø PRINT"7. END PROGRAM":PRINT
12Ø INPUT C$
13Ø IF C$="1" THEN 23Ø
14Ø IF C$="2" THEN 24Ø
15Ø IF C$="3" THEN 25Ø
16Ø IF C$="4" THEN 26Ø
17Ø IF C$="5" THEN 27Ø
18Ø IF C$="6" THEN 28Ø
19Ø IF C$="7" THEN 29Ø ELSE 4Ø
23Ø GOTO 3Ø
24Ø WIDTH32:POKE&HEØ33,16:PALETT
E12,Ø:PALETTE13,63:CLS:GOTO4Ø
25Ø WIDTH4Ø:POKE&HEØ3C,19:PALETT
EØ,Ø:PALETTE8,63:CLS1:GOTO4Ø
26Ø WIDTH4Ø:POKE&HEØ3C,19:PALETT
EØ,63:PALETTE8,Ø:CLS5:GOTO4Ø
27Ø WIDTH8Ø:POKE&HEØ45,19:PALETT
EØ,Ø:PALETTE8,63:CLS1:GOTO4Ø
28Ø WIDTH8Ø:POKE&HEØ45,19:PALETT
EØ,63:PALETTE8,Ø:CLS5:GOTO4Ø
29Ø CLS:NEW

```

Game

Guess Who

4K

By Keiran Kenny

Gather your guests around the CoCo and let them guess the names of well-known people, places or events from letters scattered randomly over the screen. You are the Quiz Master who can bring enlightenment from confusion by pressing the space bar to reveal the answer.

The display time can be varied from 1 (fairly short) to 9 (long). You can enter your own choice of categories and

names in the DATA lines beginning with Line 220, but you will need many more than my few examples to make the game interesting. The first DATA item is the category (like "Presidents" in Line 220). Enter as many names and DATA lines as you want for each category, but note that each DATA category must end with "", and also that the very last DATA entry must read END (as in Line 1000).

The listing: GUESSWHO

```

Ø 'GUESSWHO' BY KEIRAN KENNY,
SYDNEY, 1987
1Ø CLS:GOTO17Ø

```

```

20 READT$:IFT$="END"THEN150ELSEP
RINT@240-LEN(T$)/2,T$
30 PRINT@458,"PRESS <ENTER>"
40 K$=INKEY$:IFK$<>CHR$(13)THEN4
0ELSECLS
50 READA$:IFA$=""THENCLS:GOTO20
60 FORT=1TOLEN(A$)
70 IFINKEY$=CHR$(32)THEN130
80 P=1151+RND(256)
90 IFPEEK(P)<>96THEN80
100 IFMID$(A$,T,1)=CHR$(32)THENP
OKEP,96ELSEPOKEP,ASC(MID$(A$,T,1
))
110 NEXT
120 FORD=1TODL*100:IFINKEY$=CHR$
(32)THEN130ELSENEXT:CLS:GOTO60
130 CLS:PRINT@240-LEN(A$)/2,A$:G
OTO30
140 GOTO140
150 CLS:PRINT@237,T$

```

```

160 GOTO160
170 PRINT@104,"<<<GUESS WHO>>>"
180 PRINT@193,"BY KEIRAN KENNY,
SYDNEY, 1987."
190 PRINT@289,"DISPLAY TIME (1-9
):";:INPUTDL
200 IFDL<1ORDL>9THENPRINT@289,""
:GOTO190
210 CLS:GOTO20
220 DATA PRESIDENTS,GEORGE WASHI
NGTON,KENNEDY,MADISON,JOHNSON,RO
NALD REAGAN,""
230 DATA FILM STARS,MARYLIN MONR
OE,BILL COSBY,JOAN COLLINS,AUDRE
Y HEPBURN,""
240 DATA CITIES,COPENHAGEN,BUENO
S AIRES,JAKARTA,MONTREAL,MELBOUR
NE,RIO DI JANIERO,""
1000 DATA END

```

Heart & Head

Looking for a Heartbeat

By Wilmer B. Maxwell

16K
ECB

Did you know that your heart beats more than 100,000 times each day — about 36 million times a year?

Pulse Beat counts your pulse rate. When you are resting and relaxed, the pulse beat rate should be in the range of 60 to 75. Keep in mind that a child's pulse rate tends to be faster than an adult's.

Just type in, save, load and run the program and follow the onscreen prompts to get an estimate of your pulse rate.

The listing: PULSBEAT

```

100 REM: CLOAD"PULSBEAT"
110 CLS:L=227
120 FOR X=1 TO 9
130 H=32:READ T$
140 FOR T=1TO6:SOUND2,1
150 PRINT@L,CHR$(191);:GOSUB440
160 PRINT@L,T$;:GOSUB440
170 IFX=1ORX=9THENH=H+32:IFH=>64
THENH=64
180 IFX=2ORX=8THENH=H+32:IFH=>16
0THENH=160
190 IFX=3ORX=7THENH=H+32:IFH=>19
2THENH=192
200 IFX=4ORX=6THENH=H+32:IFH=>16

```

```

0THENH=160
210 IFX=5THENH=H+32:IFH=>128THEN
H=128
220 NEXT T
230 L=L+3:NEXT X
240 FOR D=1TO1800:NEXT D
250 DATA P,U,L,S,E,B,E,A,T
260 CLS4:PRINT@32," THIS PROGR
AM RECORDS YOUR"
270 PRINT" PULSE IN BEATS PER
MINUTE.":PRINT
280 PRINT" WITH YOUR LEFT HAND,
FIND YOUR"
290 PRINT"PULSE ON THE RIGHT SID
E OF YOUR"
300 PRINT"NECK, DIRECTLY UNDER Y
OUR JAW.":PRINT
310 PRINT" WITH YOUR RIGHT HAND,
TAP ANY"
320 PRINT"KEY EVERY TIME YOUR PU
LSE BEATS!"
330 PB=0:PRINT" start any
time "
340 A$=INKEY$:IF A$="" THEN 340
ELSE 350
350 TIMER=0:PB=1:SOUND 200,1:GOT
O 380
360 A$=INKEY$:IF A$=""THEN 360 E
LSE 370
370 PB=PB+1:SOUND 180,1

```



```

380 SV=TIMER:IF SV=>505 THEN 390
  ELSE 360
390 PRINT@416,"      YOUR PULSE RA
TE IS";PB*6
400 SOUND 150,8:FOR P=1TO1000:NE
XT P
410 PRINT"      PLAY AGAIN <Y/N >
?"
420 A$=INKEY$:IFA$=""THEN 420
430 IF A$="Y" GOTO 260 ELSE 500
440 FOR D=1TO50:NEXT D
450 PRINT@L-H,CHR$(128);:PRINT@L

```

```

+H,CHR$(128);
460 IFX=4THEN PRINT@428,CHR$(128
);:PRINT@460,CHR$(128);
470 IFX=5THEN PRINT@399,CHR$(128
);:PRINT@431,CHR$(128);:PRINT@46
3,CHR$(128);:PRINT@495,CHR$(179)
;
480 IFX=6THEN PRINT@434,CHR$(128
);:PRINT@466,CHR$(128);
490 RETURN
500 CLS:END
510 REM:BY W.MAXWELL,CARLISLE,PA

```

May the Force Be with You?

By Travis Halbrook

CoCo 3

Not too long ago I saw a TV advertisement for a game that was supposed to increase a person's psychic ability. The game had four lights that came on at random, and the object was to guess which light would come on next. Users said they experienced increased intuition by playing the game. I modeled my program, *Psychic Intuition Developer (PID)*, after this game.

When you load and run *PID*, you will see four boxes on the screen, numbered 1 through 4. You are to guess (with psychic intuition) which box will light up by pressing the appropriate number key. The computer will tell you if you are right or wrong. Every correct guess adds a point to your score.

There are 24 guesses in a game; the statistical norm for correct guesses is six. If you routinely rate scores of nine or more, perhaps the force is with you!

The listing: PSYCHIC

```

0 *****
*      PSYCHIC INTUITION      *
*      DEVELOPER              *
*      "BY TRAVIS HALBROOK"   *
*****
10 WIDTH32:X=RND(-TIMER):RGB:CLS
0:FOR C=1 TO 4:L$(C)=STRING$(5,1
28+16*(C-1)+15):NEXT C:FOR Y=193
TO 321 STEP 32:FOR C=0 TO 3:PRI
NT@Y+(C*8),L$(C+1);:NEXTC:NEXTY:
C=1:FOR A=259 TO 290 STEP 8:POKE
1024+A,C+48:C=C+1:NEXT A:FOR T=
1 TO 20:L=RND(4)-1
20 S=RND(255):PALETTE L,63:SOUND
S,1:RGB:NEXT T:A$="intuition"+C
HR$(128)+"developer"+CHR$(128):F
OR B=127 TO 102 STEP-1:PRINT@B,L
EFT$(A$,127-B);:FOR DLAY=1 TO 30
:NEXT DLAY:NEXT B
30 FOR T=1 TO 24:PRINT@458,"choo
se"+CHR$(128)+"one";:L=RND(4)-1:

```

```

W=L+1
40 A$=INKEY$:IF A$="" THEN 40
50 A=VAL(A$):IF A<1 OR A>4 THEN
40
60 POKE 1518,A+48:PALETTE L,63:I
F A=W THEN GOSUB 110 ELSE GOSUB
130
70 NEXT T
80 PRINT@427,"YOU GOT ";SC;:PRIN
T@457,"OUT OF 24 RIGHT";:PRINT@4
88,"PLAY AGAIN (Y/N)";
90 A$=INKEY$:IF A$<>"Y" AND A$<>
"N" THEN 90
100 IF A$="Y" THEN 160 ELSE IF A
$="N" THEN END
110 'RIGHT SUBROUTINE
120 SOUND 150,5:PRINT@396,"right
";:SC=SC+1:PRINT@10,"score="SC;:
FOR DLAY=1 TO 500:NEXT DLAY:PRIN
T@396,STRING$(5,128);:RGB:POKE 1
518,128:RETURN
130 'WRONG SUBROUTINE
140 PRINT@396,"wrong";:SOUND 1,5
:FOR DLAY=1 TO 500:NEXT DLAY:PRI
NT@396,STRING$(6,128);:RGB:POKE
1518,128:RETURN
150 'PLAY AGAIN
160 PRINT@416,STRING$(95,128);:P
OKE 1535,128:PRINT@0,STRING$(32,
128);:CLEAR:GOTO 30

```

Submissions to "Novices Niche" are welcome from everyone. We like to run a variety of short programs that can be typed in at one sitting and are useful, educational and fun. Keep in mind, although the short programs are limited in scope, many novice programmers find it enjoyable and quite educational to improve the software written by others.

Program submissions must be on tape or disk. We're sorry, but we cannot key in program listings. All programs should be supported by some editorial commentary, explaining how the program works. If your submission is accepted for publication, the payment rate will be established and agreed upon prior to publication.

A teacher at Lakeview School in Hernando, Fla., wondered if I could make up a program to teach students the names and sequence of the months of the year and give them a little workout at the keyboard, copying the months from the screen. A challenge is a challenge; overjoyed at having a specific problem to attack, I snapped at the opportunity to show off my skills.

The first thing to be done was a simple expedient. Our old faithful *Race* program of previous tutorials, which should be in your library, was chosen to give the program some graphics enhancements. Load *Race*, type `RENUM 500,0,10` and run; type `499 GOTO 499` then `LIST`.

We moved our graphic out of the way by renumbering it and checking it out. We added a perpetual loop in front of it so that, unless we deliberately intend to change it, our graphic is out of harm's way. We listed and noted the last line. We can add subroutines beginning at Line 1000 and bypass the graphic. Our creation will be developed between lines 0 and 499 and from 1000 onward.

In Line 0 type `12MONTHS`. For the time being, I will hold the space between Lines 10 and 19 for the student's name. Line 20 begins the program proper.

The plan is that each month will be enclosed in a string variable from `A$` through `L$`. Copy Line 20 from listing `12MONTHS` and run. You should get a blank screen. So far, nothing has been written. We ran the line to see if *CoCo* picked up any `SN`, `TM` or other errors that are commonly made and a nuisance to locate. We will verify for correct spelling when we print the months on the screen.

Type and run `30 PRINT:PRINT @7,"MONTHS OF THE YEAR"`. What is wrong with this line? The `PRINT` doesn't print an empty row. The `PRINT@7` prints at Location 7 on the text screen, which is on the top row. Fuzzy thinking on my part. Spaces 0 through 31 are on the top row. Since `32+7=39`, seven spaces from the left margin will be on the second, or target, row. Type and run `31 PRINT@39,"M"`. The `M` falls directly below the `M` in `MONTH`. Delete Line 31.

Florida-based Joseph Kolar is a veteran writer and programmer who specializes in introducing beginners to the powers of the Color Computer.

A tutorial to teach students the months of the year

"Thirty Days Hath September"

By Joseph Kolar
Rainbow Contributing Editor

The line I was looking for was `30 PRINT@39,"MONTHS OF THE YEAR"`.

This is not to impute that the other construction is no good. So long as the mission is accomplished and you are satisfied with the result, then rest on your laurels. Who cares what your listing looks like? The students will never suspect that you have a sloppy construction.

We plan to skip a line and print two columns. Copy Line 40. The actual, repeating format for each entry is a repetition of " 1. "X\$, where `X$` is the month in Line 20 that matches the number. Double-digit numbers will not have a blank space after the opening quote.

You may prefer to present the first and second months, side by side, paired on the top row and continue in this format. Rewrite the line, if you find that list more appealing. Double-check the spelling. Note that a comma separates each entry and locates the next column. We are into the meat of the program.

The idea is to do the months in sequence. We will require a `FOR-NEXT` loop, `FOR X=1 TO 12`. It seemed logical to begin the loop next.

`50 PRINT:FOR X=1 TO 2`. This line supports only January and February. The plan is to make a workable two-

month program. Then, if all goes well, we will expand it to a full year.

Copy Line 60 from the listing. This line orders *CoCo* to go to Line 70 when `X=1` and hop over to Line 71 when `X=2`. Line 70 will settle January, and Line 71 will handle February.

Copy lines 70 and 71 from the listing. `LIST70`. Why use `LINEINPUT` instead of `INPUT`? It omitted the annoying question mark prompt. Within quotation marks and with a two-space indent, the keyboard operator, (high-class name for student), is to type in the first month. He is to refer to Month #1 in the table for proper selection and spelling. `X$` is what he types in. If he does this task correctly and it is exactly the same as `A$` in Line 20, *CoCo* is directed to Line 90. `C=C+1` counts how many months are successfully typed. Since it has to be all 12, this line is useless, but it doesn't cost anything.

After typing all 12 months, *CoCo* is told to clear the display, put on a fresh table and go to the next month. The only problem is that if the table is included in the loop, the true loop should be in front of Line 30.

`25 FOR X=1 TO 12`. We need to print the empty row in Line 50 for aesthetic value. Lap off the `FOR-NEXT` statement.

Enter `EDIT50`. Use the space bar to position the cursor over the colon, press `H` and `ENTER`. Run. If you spelled the months correctly a `UL` error popped up, suggesting more lines be created. In the event that the word was misspelled or the wrong word typed in, Line 70 directs *CoCo* to `GOSUB300` and then return.

Key in Line 300 from the listing. This is the hoo-hoo calculator, `F=F+1`, just in case we want the sum total of the bad spellings. A line is skipped. A message gives the bad news and returns. Note the unused variable, `N$`. Make a deliberate typing error to check this line out. If the student is a real klutz, after the third bad news report, the table will scroll up, up and away. We counted the number of attempts, `T`, to do a particular month. If `T=3`, give up, clear the screen, reset `C` for a fresh start and begin from the beginning.

At this point, we put in Line 26, `26 T=0`, inside the loop to reset it to 0.

`24 C=0:F=0`. We are not likely to use these reset counters. When the program is recycled, Line 24 is the first line to be repeated after a successful run-through. Copy all lines from 72 through 81. Upon

completion, CoCo jumps back to the beginning.

Copy lines 90 and 95. After December is typed in correctly, we zoom over to our graphic. The three-line text will be changed:

```
530 PRINTTAB(11)"GOOD WORK,"
550 PRINTTAB(12)N$"! "
560 PRINT:PRINTTAB(6)"YOU
HAVE ALL TWELVE:"PRINTTAB(8)
"MONTHS CORRECTLY."
```

This is great, but we are hung up with no end in sight. Notice the exclamation point. The name, N\$, should go there. It is high time to give the student an opportunity to personalize his or her work.

Key in lines 10 to 14. Line 10 is familiar, creating five blank rows. A name is requested. Line 12 gives instructions. I didn't know how to add PRESS <ENTER> to Line 12. First, I located the message so that it would be tastefully located and visible even though it came after the Type Prompt. Then I found that the seventh row began at 192 and printed nothing there but reserved the line. Now, the LINEINPUT would fall where it was expected. Line 14 moved

us along with a time-waster. The name was printed, stored in memory and CoCo was told to keep working.

Running through all the colors over and over again in effect hangs us up. We decided to use just three colors. The first one would race around the text. When the second color came up, we went to a subroutine at Line 1000 that inquires whether or not we want to repeat the exercise. When the third color comes up we wipe out the window, all except the name, and then jump back for a new exercise, bypassing the name routine.

```
570 FOR C=3TO7 STEP2
575 IF C=5 GOSUB1000
576 IF C=7 GOTO290
780 NEXTC: IF C=7 GOTO 790
```

This breaks out of the maddening loop.

For some reason or other I have the same instruction twice: IF C=7 GOTO290. What happened was that I destroyed this program and had to redo it from memory.

Type and enter the following:

```
900 NEXTC: FOR Z=1TO1000:
NEXT:CLS:GOTO20
```

Copy lines 1000 through 1050 from the listing:

```
B90 SCREEN0,1
EDIT1000 <I> <SCREEN0,1:>
```

These last two changes show us that we can change the color of our window without disturbing the overlying graphics. It also adds a bit of interest.

Mask Line 890 after the first statement. This line leaves the name on the screen till the last second. Line 1012 ended with a proper question mark. The question mark is inappropriate only when the name is showing. Line 885 prints the name in the exact location and blanks out the question mark.

Compare initial location positions of Line 1012, $(197+64=261)$ and Line 885, (264). The white border ends eight spaces to the left of the first letter of the name. The purple border ends five spaces to the left of the first letter of the name. We considered the first letter of the name as our reference point in doping out these two lines.

Line 1000 turns the screen to the alternate color. Line 1005 blanks out the top line, GOOD WORK,. Line 1010 prints a question. Note that the PRINT@ location is in the sixth column, at the left

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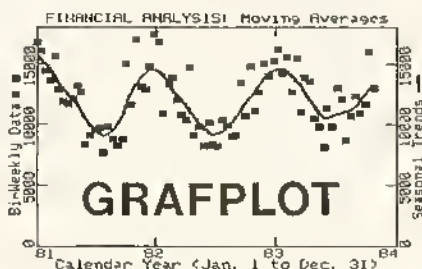
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border of the text window. If you want to see where it is changed, change Line 1010 to 196 temporarily and run. Lines 1011 through 1014 all begin in the same column. The added value +32 to each succeeding line drops the location down a row while still remaining in the proper column. The spaces after the opening quote were designed to obliterate the previously existing text.

If you look carefully, you will see a remnant on the screen. Do you see the period left after Line 1020 does its work? It is about five spaces after ND on the screen. Enter EDIT1020 and type 18; press the space bar into the blank area after text. Press I and the space bar, enter and run. We added just one space to do the job. If we had added them indiscriminately, we might have crashed through the right border. If we had left off the semicolon, we would have gone clear to the end of the row, ruining our carefully crafted graphic.

Line 1005 begins at 170. This location was before the GOOD WORK, line. Enough blank spaces were set to blank out the line. What would happen if I used 197-32 instead of 170? Think! Now, try it and see!

Lines 1014 and 1020 could have easily been combined into a single line. Mask

lines 1014 and 1020. This leaves MONTHS CORRECTLY exposed in the text window.

Enter and run 1015 PRINT@197+128"12345678YES/ND12345678";. Pretend the numerals are blank spaces. That pesky dot is under one of the numbers after ND. You can see that the eight numbers on each side center the text correctly. This technique is a lot of work but it is a good tutorial device to help you in locating the exact starting position.

Line 1015 begins printing at 197+128=(325). Add the three blank spaces to the left of MONT and you find where the M is situated (328). Five blank spaces follow the opening quote, and the centered text follows. We need six blank spaces to cover the pesky dot and then we can close out, allowing us to finalize the line:

```
1015 PRINT328," YES/ND ";
```

You have three choices: Unmask lines 1014 and 1020 and mask Line 1015; leave it as it is; or leave Line 1015 unmasked, deleting lines 1014 and 1020. Save 12MONTHS.

You can see programming takes lots of planning. It takes a lot of trial and

error before you and CoCo are of one mind. Lots of mistakes or poor logic add spice to the ultimate success. This tutorial was presented from my frame of reference, the sum total of my CoCo knowledge, and my faulty logic. Certainly there are other ways to approach each problem.

If you work along with me and at times say to yourself, "I would have done this in such and such a way. I know an easier way. Kolar isn't so smart," I congratulate you. You are doing your own thinking and imprinting your personality on your work. You are healthily skeptical of so-called experts and allow your creative side to assert itself. I hope you remain flexible in your approach to CoCo's quirks and develop your own bag of tricks. Make mistakes — and brag about them, for we all learn from mistakes. But go back to the keyboard for a creative session that will lead into the vast unknown.

Our next project will involve the opening frame of 12MONTHS. With all the Lo-Res graphics under our belt, don't you think you could dress up the opening segment? Create something neat, in case I wander off onto some unrelated subject.

See you next month!

□

73	.....11
81	.....118
650	.....186
780	.....239
900	.....244
END	.....47

The listing:

```
0 '<12MONTHS>
10 CLS: FOR X=1TO5:PRINT:NEXT
11 PRINT@258,"PRESS <ENTER>":PRI
NT@192,"";
12 LINEINPUT" TYPE IN YOUR NAME
: ";N$
14 FOR Z=1 TO 500:NEXT
20 CLS:A$="JANUARY":B$="FEBRUARY
":C$="MARCH":D$="APRIL":E$="MAY"
:F$="JUNE":G$="JULY":H$="AUGUST"
:I$="SEPTEMBER":J$="OCTOBER":K$=
"NOVEMBER":L$="DECEMBER"
24 C=0:F=0
25 FOR X=1 TO 12
26 T=0
30 PRINT@39,"MONTHS OF THE YEAR"
40 PRINT:PRINT" 1. "A$," 7. "G$,
" 2. "B$," 8. "H$," 3. "C$," 9.
"I$," 4. "D$,"10. "J$," 5. "E$,"
```

```
11. "K$," 6. "F$,"12. "L$
50 PRINT
60 ON X GOTO70,71,72,73,74,75,76
,77,78,79,80,81
70 LINEINPUT" TYPE IN MONTH 1.
";X$:IF X$=A$ THEN GOTO90 ELSE G
OSUB300:GOTO70
71 LINEINPUT" TYPE IN MONTH 2.
";X$:IF X$=B$ THEN GOTO90 ELSE G
OSUB300:GOTO71
72 LINEINPUT" TYPE IN MONTH 3.
";X$:IF X$=C$ THEN GOTO90 ELSE G
OSUB300:GOTO72
73 LINEINPUT" TYPE IN MONTH 4.
";X$:IF X$=D$ THEN GOTO90 ELSE G
OSUB300:GOTO73
74 LINEINPUT" TYPE IN MONTH 5.
";X$:IF X$=E$ THEN GOTO90 ELSE G
OSUB300:GOTO74
75 LINEINPUT" TYPE IN MONTH 6.
";X$:IF X$=F$ THEN GOTO90 ELSE G
OSUB300:GOTO75
76 LINEINPUT" TYPE IN MONTH 7.
";X$:IF X$=G$ THEN GOTO90 ELSE G
OSUB300:GOTO76
77 LINEINPUT" TYPE IN MONTH 8.
";X$: IF X$=H$ THEN GOTO90 ELSE
GOSUB300:GOTO77
78 LINEINPUT" TYPE IN MONTH 9.
```



```

";X$:IF X$=I$ THEN GOTO90 ELSE G
OSUB300:GOTO78
79 LINEINPUT" TYPE IN MONTH 10.
";X$:IFX$=J$ THEN GOTO90 ELSE GO
SUB300:GOTO79
80 LINEINPUT" TYPE IN MONTH 11.
";X$:IF X$=K$ THEN GOTO90 ELSE G
OSUB300:GOTO80
81 LINEINPUT" TYPE IN MONTH 12.
";X$:IF X$=L$ THEN GOTO 90 ELSE
GOSUB300:GOTO81
90 C=C+1: IF C<13 THEN CLS
95 IF C=12 THEN 500 ELSE NEXT
300 F=F+1:PRINT: PRINT" WRONG!
TRY AGAIN, "N$;,:T=T+1:IF T=3 T
HEN CLS:GOTO24 ELSE RETURN
490 NEXT
499 GOTO499
500 '<RACE>
510 CLS
520 FOR X=1 TO 5:PRINT:NEXTX
530 PRINTTAB(11)"GOOD WORK,"
540 PRINT
550 PRINTTAB(12)N$"! "
560 PRINT:PRINTTAB(6)"YOU TYPED
ALL TWELVE":PRINTTAB(8)"MONTHS C
ORRECTLY."
570 FOR C=3 TO7 STEP2
575 IF C=5 GOSUB1000
576 IF C=7 GOTO790
580 FOR H=0 TO 63STEP2:SET(H,0,C
):NEXTH
590 FOR V=0 TO 31STEP+2:SET(63,V
,C):NEXTV
600 FOR H=63 TO 0 STEP-2:SET(H,3
1,C):NEXTH
610 FOR V=31 TO 2 STEP-2:SET(0,V
,C):NEXTV
620 FOR H=2 TO 61 STEP2:SET(H,2,
C):NEXTH
630 FOR V=2 TO 29 STEP2:SET(61,V
,C):NEXTV
640 FOR H=59 TO 2 STEP-2:SET(H,2
9,C):NEXTH
650 FOR V=27 TO 4 STEP-2:SET(2,V
,C):NEXTV
660 FOR H=4TO59 STEP2:SET(H,4,C)
:NEXTH
670 FOR V=4TO27 STEP2:SET(59,V,C
):NEXTV
680 FOR H=57 TO4STEP-2:SET(H,27,
C):NEXTH
690 FOR V=25 TO 6 STEP-2:SET(4,V
,C):NEXTV
700 FOR H=6TO57 STEP2:SET(H,6,C)
:NEXTH
710 FOR V=6TO25 STEP2:SET(57,V,C
):NEXTV
720 FOR H=55 TO 6 STEP-2:SET(H,2
5,C):NEXTH

```

```

730 FOR V=23 TO6 STEP-2:SET(6,V,
C):NEXTV
740 FOR H=8TO55STEP2:SET(H,8,C):
NEXTH
750 FOR V=8 TO23 STEP2:SET(55,V,
C):NEXTV
760 FOR H=53 TO8STEP-2:SET(H,23,
C):NEXTH
770 FOR V=21 TO 8STEP-2:SET(8,V,
C):NEXTV
780 NEXTC:IF C=7 GOTO790
790 FORH=10TO53STEP2:SET(H,10,C)
:NEXTH
800 FOR V=10 TO21STEP2:SET(53,V,
C):NEXTV
810 FOR H=51 TO10STEP-2:SET(H,21
,C):NEXTH
820 FOR V=19 TO 12STEP-2:SET(10,
V,C):NEXTV
830 FORH=12 TO51 STEP2:SET(H,12,
C):NEXTH
840 FOR V=12 TO19 STEP2:SET(51,V
,C):NEXTV
850 FORH=49 TO12 STEP-2:SET(H,19
,C):NEXTH
860 FOR V=17 TO14 STEP-2:SET(12,
V,C):NEXTV
870 FORH=14TO49STEP2:SET(H,14,C)
:NEXTH
880 SET(49,16,C)
885 PRINT@264," ";N$ " ";
890 SCREEN0,1:'FOR H=47 TO14STEP
-2:SET(H,16,C):NEXTH
900 NEXTC:FORZ=1TO1000:NEXT:CLS:
GOTO20
910 GOTO910
1000 SCREEN0,1: FOR Z=1TO2000:NE
XT
1005 PRINT@170," ";
1010 PRINT@197," DO IT AGAIN
,";
1011 PRINT@197+32,"
";
1012 PRINT@197+64," ";N$"?
";
1013 PRINT@197+96,"
";
1014 PRINT@197+128," ";
1015 'PRINT@328," YES/NO
";
1020 PRINT" YES/NO ";
1025 Z$=INKEY$:IF Z$="" GOTO1025
1030 IF LEFT$(Z$,1)="Y" THEN RET
URN
1040 IF LEFT$(Z$,1)="N" THEN CLS
2:PRINT@198," BYE,BYE, ";N$ " ";
1050 GOTO1050

```

RAINBOW

Give us your best: Join the ranks of these courageous CoCoists in showing the Color Computer world your high score at your favorite micro-diversion. We want to put your best effort on record in THE RAINBOW's "Scoreboard" column. All entries must be received 60 days prior to publication. Entries should be printed — legibly — and must include your *full* name, address, game title, company name and, of course, your high score. Each individual is limited to three score entries per month. Send your entries to Scoreboard, c/o THE RAINBOW. For greater convenience, your high scores may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type SEND and address to: EDITORS.

★ Current Record Holder

● Shutout

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4,475 David Schaller, Clarkston, WA
4,500 Frankie DiGiovanni, Olney, MD
4,300 Jeffrey Warren, Weynesville, NC
3,960 Maurice MacGarvey, Dawson Creek, British Columbia

ASTRO BLAST (Merk Dale)
48,825 ★Tony Bacon, Mt. Vernon, IN
BALLOON (THE RAINBOW, 5/87)
7,000 ★Jon Hobson, Plainfield, WI

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12,825 Frederick Lajoie, Nova Scotia, Canada
12,350 Tom Carpenter, Palenville, NY
11,675 Daniel Hartmann, Osoyoos, British Columbia

10,850 Matthew Yarows, Easthampton, MA
BOUNCING BOULDERS (Diacom Products)
10,930 ★Patrick Ganneau, Ste-Croix, Orrebec

BUZZARD BAIT (Tom Mix)
22,931,850 ★Skip Taday, East Lyme, CT
783,550 Gerard Stalker, Rivordale, GA
187,750 Kelli Jenas, Kivwanga, British Columbia

CANYON CLIMBER (Radio Shack)
1,725,100 ★John Grpirlit, Columbia, MO
1,627,500 Matthew Fumich, Munford, TN
202,000 David Brown, New Waterford, Nova Scotia

176,200 Darran King, Yorkton, Saskatchewan
169,000 Gregory Speer, Emporia, KS
CASHMAN (Mick Trort)
9,870 ★Martin Parada, Arcadia, CA

CLOWNS & BALLOONS (Radio Shack)
688,960 ★Faye Keeler, Augusta, GA
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70,180 Charles Andrews, Della Jct, AK
36,650 Melody Webb, Lakeport, CA
33,710 Timm Cappell, Freeland, MI

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119.0 ★Adam Silverstein, Chicago, IL
111.2 David Czarnocki, Northampton, MA
43.0 ★Jason Kopp, Downs, IL

COLOR CAR (NOVASOFT)
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110,870 Martin Parada, Arcadia, CA

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38,011,600 ★Earl Foster, Lynchburg, VA
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CRYSTAL CASTLES (Thunder Vision)
381,138 ★Jason Trammel, Murphysboro, IL
DALLAS QUEST (Radio Shack)

81 ★Brad Wilson, Lithia Springs, GA
85 Paul Summers, Orange Park, FL
85 David and Shirley Johnson, Leicester, NC

86 Roy Grant, Toledo, OH
86 Melanie Moor, Florence, AL
87 Andrew Yarows, Easthampton, MA
87 Dorgias Bell, Duncan, OK
102 Hugh Flounoy, Jr., Spanaway, WA

DECATHLON (Spectral Associates)
9,408 ★Martin Parada, Arcadia, CA

DEFENSE (Spectral Associates)
16,305 ★Patrick Martel, Laval, Quebec

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35,331 David Schaller, Clarkston, WA
31,673 Douglas Bacon, Middletown, CT
30,753 Pasha Ishad, Silver Spring, MD
30,326 Frederick Lajoie, Nova Scotia, Canada

DEMON ATTACK (imagic)
279,435 ★Jon Hobson, Plainfield, WI
202,260 Tom Briggs, Hillsdale, NY
89,285 Upton Thomas, Arnold, MD
72,410 Glenn Hodgson, Aberdeenshire, Scotland

67,760 Jim Davis, Sandwich, IL
DESERT RIDER (Radio Shack)
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63,014 Rebecca Hendelson, Ballston Spa, NY
62,702 William Currie, Bryans Road, MD
50,797 Patrick Devitt, Lombard, IL
47,677 Thomas Beall, Odenon, MD

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1,866,100 ★Stephane Martel, Laval, Quebec
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75,000 Blake Cadmus, Reading, PA
40,800 Benoit Landry, Drummondville, Quebec

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172,320 Richard Winkelbauer, Bronx, NY
136,510 Don Mullis, Delavan, WI
51,470 Betty Mullis, Delavan, WI
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98,985 Karl Guillford, Summerville, SC
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89,490 Noll Edge, Williston, FL
77,254 Tom Audas, Fremont, CA
73,346 Jean-Francois Morin, Loretteville, Quebec

70,142 Chris Goodman, Bellmore, MD
68,142 Cooper Valentin, Veenby, British Columbia

67,721 Keith Yamparis, Jallrey, NH
62,442 Eddie Lawrence, Pasadena, Newlandland
55,300 Patrico Gonzalez, Buenos Aires, Argentina

49,500 Genny Perkins, Clifton Forge, VA
49,441 Kevin Pater, Port Alberni, British Columbia
49,254 David Brown, New Waterford, Nova Scotia

43,502 Mike Ellis, Charlotte, MI
41,896 Antonio Hidalgo, San Jose, Costa Rica

40,360 Jesse Binns, Phoenix, AZ
35,611 Adem Broughton, Morris, PA

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160,835 ★Eric Olson, Wheaton, IL
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5,660 Kathy Rumpel, Arcadia, WI
3,760 Rick Beevers, Bloomfield, MN
3,505 Blake Cadmus, Reading, PA

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31,100 ★Upton Thomas, Arnold, MD
29,030 David Czarnocki, Northampton, MA
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22,250 Dave Staub, Moundsville, WV
11,830 Sheldon Penney, Green Bay, Newfoundland

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357,890 Jason Clough, Houston, TX
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23,643,720 ★Goran Stalker, Rivordale, GA
20,921,490 Randall Edwards, Dunlap, KS
10,222,940 Clinton Morell, Sacramento, CA
10,020,500 Ken Hubbard, Madison, WI
7,493,340 Stirling Dell, Dundalk, Ontario

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7 ★Banoli St-Jean, Gelineau, Quebec

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6,090 ★Cui Lebel, Louisville, KY
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162,555 147,235 KORDNIS RIFT (Epyx)	*Marlin Parada, Arcadia, CA Mike LeBrun, Cornwall, Ontario	54 54 54 51 49 14 9 POPCORN (Radio Shack)	*Sean Noonan, Green Bay, WI *Thomas Payton, Anderson, SC *Jeff Szczerba, Sirmievani, WI *Brad Wilson, Lithia Springs, GA Christlan Grenier, Valleyfield, Quebec Randy Venable, Coal City, WV Eric Mellon, Newark, DE Larndre Clemon, Sacramento, CA	303,520 SUPER ROOTER (THE RAINBOW, 5/86)	*Mavis Hartmann, Osoyoos, British Columbia *Frederick Lajore, Nova Scotia, Canada
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31 44 MEGA-BUG (Radio Shack)	*Paul Summers, Orange Park, FL Matthew Smith, Courtenay, British Columbia	8,407,772 1,404,000 1,201,383 1,003,104 326,192 RADIO BALL (Radio Shack)	*John Haldane, Tampa, AZ Crrlrs Goodson, Sao Paulo, Brazil Milan Parekh, Anaheim, CA Elisa Goodson, Sao Paulo, Brazil Marlin Parada, Arcadia, CA	60,020 45,000 TREKBOER (Mark Dara)	123 132 118,720 74,780 72,000 TUT'S TOMB (Mark Dara)
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5,960 5,528 MEMOCARDS (THE RAINBOW, 8/87)	Mary Jensen, El Cajon, CA Douglas Bacon, Middletown, CT	1,000,948 323,167 292,633 288,084 270,000 RETURN OF THE JET-1 (ThunderVision)	*Steven Ujvary, Calgary, Alberta Kenneth Hill, Severna Park, MD David Richards, Huntington, WV Donald Cathcart, Halifax, Nova Scotia Russell Johnson, Sarnia, Ontario	60,020 45,000 TREKBOER (Mark Dara)	123 132 118,720 74,780 72,000 TUT'S TOMB (Mark Dara)
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MICROBES (Radio Shack)	*Jeff Spiller, Smclairville, NY	1,792,800 RETURN OF THE JET-1 (ThunderVision)	*Chad Presley, Luseland, Saskatchewan	60,020 45,000 TREKBOER (Mark Dara)	123 132 118,720 74,780 72,000 TUT'S TOMB (Mark Dara)
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468,750 355,570 318,160 144,510 137,920 MUNCHKIN BLASTER (THE RAINBOW, 8/87)	*Jim Davis, Sandwich, IL Gabe Emerson, Baraboo, WI Tom Beeker, Gracey, KY Edward Kavanaugh, North Easton, MA John Weaver, Amsterdam, NY Jacob Carpenter, Palenville, NY Clara Smith, Courtenay, British Columbia	63,934 43,222 27,542 21,682 17,851 ROLLER CONTROLLER (Spectra! Associates)	*Marshall Wersnburger, Quincy, IL Hans Lutenegeger, Madison, IA Melanie Lapornl, Fitchburg, MA Paul Blessing, Spring, TX Yvan Langlois, Laval, Quebec	60,020 45,000 TREKBOER (Mark Dara)	123 132 118,720 74,780 72,000 TUT'S TOMB (Mark Dara)
11,950 10,420 9,760 9,270 MUNCHKIN BLASTER (THE RAINBOW, 8/87)	*Jim Davis, Sandwich, IL Gabe Emerson, Baraboo, WI Tom Beeker, Gracey, KY Edward Kavanaugh, North Easton, MA John Weaver, Amsterdam, NY Jacob Carpenter, Palenville, NY Clara Smith, Courtenay, British Columbia	63,934 43,222 27,542 21,682 17,851 ROLLER CONTROLLER (Spectra! Associates)	*Marshall Wersnburger, Quincy, IL Hans Lutenegeger, Madison, IA Melanie Lapornl, Fitchburg, MA Paul Blessing, Spring, TX Yvan Langlois, Laval, Quebec	60,020 45,000 TREKBOER (Mark Dara)	123 132 118,720 74,780 72,000 TUT'S TOMB (Mark Dara)
9,080 8,720 5,670 ONE-ON-ONE (Radio Shack)	*Thomas Payton, Anderson, SC *Jonathan Dorris, Indianapolis, IN *Brandon Raaca, Chickamauga, GA *William Curria, Bryans Road, MD *Gragg Thompson, Chesterfield, VA	63,934 43,222 27,542 21,682 17,851 ROLLER CONTROLLER (Spectra! Associates)	*Marshall Wersnburger, Quincy, IL Hans Lutenegeger, Madison, IA Melanie Lapornl, Fitchburg, MA Paul Blessing, Spring, TX Yvan Langlois, Laval, Quebec	60,020 45,000 TREKBOER (Mark Dara)	123 132 118,720 74,780 72,000 TUT'S TOMB (Mark Dara)
38,640 PAPER ROUTE (Diecom Products)	*Dave Staub, Moundsville, WV	63,934 43,222 27,542 21,682 17,851 ROLLER CONTROLLER (Spectra! Associates)	*Marshall Wersnburger, Quincy, IL Hans Lutenegeger, Madison, IA Melanie Lapornl, Fitchburg, MA Paul Blessing, Spring, TX Yvan Langlois, Laval, Quebec	60,020 45,000 TREKBOER (Mark Dara)	123 132 118,720 74,780 72,000 TUT'S TOMB (Mark Dara)
150,550 PEGASUS AND THE PHANTOM RIDERS (Radio Shack)	*Heather Hamblen, Bar Harbor, ME	63,934 43,222 27,542 21,682 17,851 ROLLER CONTROLLER (Spectra! Associates)	*Marshall Wersnburger, Quincy, IL Hans Lutenegeger, Madison, IA Melanie Lapornl, Fitchburg, MA Paul Blessing, Spring, TX Yvan Langlois, Laval, Quebec	60,020 45,000 TREKBOER (Mark Dara)	123 132 118,720 74,780 72,000 TUT'S TOMB (Mark Dara)
329,000 303,100 261,000 225,300 114,100 PINBALL (Radio Shack)	*Joseph Delaney, Aurgusta, GA Mike Grant, Fresno, CA Domingo Martinez, Miami, FL Richard Adams, Jr., Alvarado, TX Krag Bryson, Woodstock, GA	63,934 43,222 27,542 21,682 17,851 ROLLER CONTROLLER (Spectra! Associates)	*Marshall Wersnburger, Quincy, IL Hans Lutenegeger, Madison, IA Melanie Lapornl, Fitchburg, MA Paul Blessing, Spring, TX Yvan Langlois, Laval, Quebec	60,020 45,000 TREKBOER (Mark Dara)	123 132 118,720 74,780 72,000 TUT'S TOMB (Mark Dara)
1,139,450 PITFALL II (Acirvision)	*Benorl Landry, Drummandville, Quebec	63,934 43,222 27,542 21,682 17,851 ROLLER CONTROLLER (Spectra! Associates)	*Marshall Wersnburger, Quincy, IL Hans Lutenegeger, Madison, IA Melanie Lapornl, Fitchburg, MA Paul Blessing, Spring, TX Yvan Langlois, Laval, Quebec	60,020 45,000 TREKBOER (Mark Dara)	123 132 118,720 74,780 72,000 TUT'S TOMB (Mark Dara)
399,350 389,463 213,300 142,400 PITFALL II (Acirvision)	Troy Stoll, Washington, IN Thomas Payton, Anderson, SC Patrick Maillet, Laval, Quebec Thomas Payton, Anderson, SC	63,934 43,222 27,542 21,682 17,851 ROLLER CONTROLLER (Spectra! Associates)	*Marshall Wersnburger, Quincy, IL Hans Lutenegeger, Madison, IA Melanie Lapornl, Fitchburg, MA Paul Blessing, Spring, TX Yvan Langlois, Laval, Quebec	60,020 45,000 TREKBOER (Mark Dara)	123 132 118,720 74,780 72,000 TUT'S TOMB (Mark Dara)
159,400 104,479 PITSTDP II (Epyx)	*David Cornette, Green Bay, WI David Stewall, Kent, OH	63,934 43,222 27,542 21,682 17,851 ROLLER CONTROLLER (Spectra! Associates)	*Marshall Wersnburger, Quincy, IL Hans Lutenegeger, Madison, IA Melanie Lapornl, Fitchburg, MA Paul Blessing, Spring, TX Yvan Langlois, Laval, Quebec	60,020 45,000 TREKBOER (Mark Dara)	123 132 118,720 74,780 72,000 TUT'S TOMB (Mark Dara)
54 54 PITSTDP II (Epyx)	*Risty Breitbach, Rickardsville, IA *Jall Coburn, Easton, PA	63,934 43,222 27,542 21,682 17,851 ROLLER CONTROLLER (Spectra! Associates)	*Marshall Wersnburger, Quincy, IL Hans Lutenegeger, Madison, IA Melanie Lapornl, Fitchburg, MA Paul Blessing, Spring, TX Yvan Langlois, Laval, Quebec	60,020 45,000 TREKBOER (Mark Dara)	123 132 118,720 74,780 72,000 TUT'S TOMB (Mark Dara)
54 54 PITSTDP II (Epyx)	*Risty Breitbach, Rickardsville, IA *Jall Coburn, Easton, PA	63,934 43,222 27,542 21,682 17,851 ROLLER CONTROLLER (Spectra! Associates)	*Marshall Wersnburger, Quincy, IL Hans Lutenegeger, Madison, IA Melanie Lapornl, Fitchburg, MA Paul Blessing, Spring, TX Yvan Langlois, Laval, Quebec	60,020 45,000 TREKBOER (Mark Dara)	123 132 118,720 74,780 72,000 TUT'S TOMB (Mark Dara)
54 54 PITSTDP II (Epyx)	*Risty Breitbach, Rickardsville, IA *Jall Coburn, Easton, PA	63,934 43,222 27,542 21,682 17,851 ROLLER CONTROLLER (Spectra! Associates)	*Marshall Wersnburger, Quincy, IL Hans Lutenegeger, Madison, IA Melanie Lapornl, Fitchburg, MA Paul Blessing, Spring, TX Yvan Langlois, Laval, Quebec	60,020 45,000 TREKBOER (Mark Dara)	123 132 118,720 74,780 72,000 TUT'S TOMB (Mark Dara)
54 54 PITSTDP II (Epyx)	*Risty Breitbach, Rickardsville, IA *Jall Coburn, Easton, PA	63,934 43,222 27,542 21,682 17,851 ROLLER CONTROLLER (Spectra! Associates)	*Marshall Wersnburger, Quincy, IL Hans Lutenegeger, Madison, IA Melanie Lapornl, Fitchburg, MA Paul Blessing, Spring, TX Yvan Langlois, Laval, Quebec	60,020 45,000 TREKBOER (Mark Dara)	123 132 118,720 74,780 72,000 TUT'S TOMB (Mark Dara)
54 54 PITSTDP II (Epyx)	*Risty Breitbach, Rickardsville, IA *Jall Coburn, Easton, PA	63,934 43,222 27,542 21,682 17,851 ROLLER CONTROLLER (Spectra! Associates)	*Marshall Wersnburger, Quincy, IL Hans Lutenegeger, Madison, IA Melanie Lapornl, Fitchburg, MA Paul Blessing, Spring, TX Yvan Langlois, Laval, Quebec	60,020 45,000 TREKBOER (Mark Dara)	123 132 118,720 74,780 72,000 TUT'S TOMB (Mark Dara)
54 54 PITSTDP II (Epyx)	*Risty Breitbach, Rickardsville, IA *Jall Coburn, Easton, PA	63,934 43,222 27,542 21,682 17,851 ROLLER CONTROLLER (Spectra! Associates)	*Marshall Wersnburger, Quincy, IL Hans Lutenegeger, Madison, IA Melanie Lapornl, Fitchburg, MA Paul Blessing, Spring, TX Yvan Langlois, Laval, Quebec	60,020 45,000 TREKBOER (Mark Dara)	123 132 118,720 74,780 72,000 TUT'S TOMB (Mark Dara)
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SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints, tips or responses to questions, or want help yourself, we encourage you to write to the Scoreboard, c/o THE RAINBOW.

In response to questions from:

• Mike Snyder: In *Dungeons of Daggorath*, to get the iron sword and the ring on the first level, you must kill both blobs. To mean the ring, type I FIRE.

Vick Mishra
Newington, CT

• Sean Noonan: You need the diamond ring hidden in the grassy meadows atop the steps in *Sea Search*. You will need the shovel for this.

• Jimmy Munroe: The thing you stumbled over in the cavern behind the falls in *Sea Search* is the shovel. Simply type GET SHOVEL. If you haven't found the metal detector, it's in the meadows atop the steps.

To find the mermaid, get in the boat and go north twice. Go into the ocean (you must have the filled air tanks) and give her the mirror. The mirror is found by going east once past the steps on the beach and digging. Any clear liquid you find will be the shark repellent.

Laura Kaplan
Neville, FL

• John Anderson: In *Sir Raulolf of the Moors*, type PULL CHAIN and WIPE WALLS to reveal the exit from the pit.

There is one key that I have never been able to find, despite mapping the entire surrounding area. How do I get this elusive key?

Douglas Bacon
Middletown, CT

• John Peavy: In *Caladuril Flame of Light*, you must have the amulet to get by the spears.

How do you get through the castle?

Mason Taylor
Cedar Falls, IA

Scoreboard:

How do you get to the fourth level in *Dungeons of Daggorath*?

John Sprinkle
Candler, NC

Scoreboard:

In *Dallas Quest*, it is almost impossible to get through the wheat field. When I ask for a clue, I am told to solve the pasture mystery. Please help.

Tammy Upm
Rassville, GA

Scoreboard:

In *Sands of Egypt*, I am having trouble finding the canteen. Where is the magnifying glass to light the torch? How do you get out of the pool?

Trd Kling
Fennville, MI

Scoreboard:

In the *Interbank Incident*, to open the locker at the train station in Seattle, put a quarter in the locker and search it.

How do you open the apartment doors and where do you get the keys? How do you know when it's time for the video tournament?

Lori Marrison
Toronto, Ontario

Scoreboard:

In *Ranku-Tu*, does the ring mean anything and if it does, how do you cross it to open the door? What do you do when you get out of the temple through the secret passage way?

In *Pyramid 2000*, how do you find the treasure in the maze?

Mike Ahballe
Rochester, NY

Scoreboard:

In *Rauka-Tu*, I have gotten out, but what do I do next?

John Mullan
Cape Coral, FL

Scoreboard:

When you get to the pub in *Shenanigans*, you have to order O'Shannasee beer, then go W, S, W and W.

To get rid of the snake, you drop the shamrock at the cave entrance.

When you get to the ravine in the cave, type SAY SEAN.

I got to the rainbow, but I can't get near it without the pole, and the pole won't fit in the cave. How do I find the trap door in the cabin?

Amette Clear
San Diego, CA

Scoreboard:

I have the gem, the amulet and the circle in *Caladuril Flame of Light*, but now I am stumped. Where do I find Samzin so I can place the circle on his head?

In *Wild West*, I have the treasure map

from Black Bart's girlfriend, but where do I go from there?

In *Mythology*, how do you distract Atlanta so you can win the foot race and win her hand in marriage?

Floyd Keirnan
Orange, CA

Scoreboard:

In *Pyramid 2000*, to get the bird, you must first get the statue box. To pick up the bird you must drop the scepter. To get a gold nugget you must go around a great hall. To sear the serpent, throw the bird.

When you get to the plant begging for water, how do you get the water to the ground without breaking the vase? Is there something to drop it on? If so, what?

David Czarnecki
Northampton, MA

Scoreboard:

In *Sir Raulolf of the Moors*, type WIPE SLIME, LOOK WALL, LOOK OUTLINE and PULL RING to get out of the pit.

In the *Interbank Incident*, search the water fountain in Rio and you will find a ring.

In the *Lighthouse Adventure*, how do you get past the guard?

In *Escape from Sparta*, where do you find the chips that give you access in the computer?

Charles Bell
Clinton, NJ

Scoreboard:

How do you navigate the mine room in *Rohot Odyssey I*?

Andrew Irwin
Port Huron, MI

To respond to other readers' inquiries and requests for assistance, reply to "Scoreboard Pointers," c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will share your reply with all "Scoreboard" readers in an upcoming issue.

For greater convenience, "Scoreboard Pointers" and requests for assistance may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type SEND and address to: EDITORS. Be sure to include your complete name and address.



*A program enabling you to view
MacPaint picture files on your CoCo*

Get the Picture?

By Al Elmer

Although several *MacPaint* viewers are available for the CoCo 3, it is more difficult to find one for the CoCo 2. I have written this program specifically for the CoCo 2, but it is compatible with the CoCo 3. The program requires 64K Extended Color BASIC and a disk drive to run. With a few minor modifications that are explained later, it will also work on cassette-based systems, although not too well.

First of all, what is *MacPaint*? *MacPaint* is a drawing program for the Apple Macintosh computer. Files generated by *MacPaint* usually have the extension .MAC, although .PIC and .PNT are also common. In order to view *MacPaint* picture files on your CoCo, the problem of different screen resolutions between the Macintosh and CoCo must be solved. *MacPaint* (Mac for short) pictures have a resolution of 576-by-720 while the highest resolution of the CoCo 2 is 256-by-192. Thus only a portion of a Mac image can be displayed on the CoCo's highest resolution screen. To solve the problem, this program allows you to scroll around the entire Mac image by pressing the arrow keys. Also offered is the ability to compress the image both horizontally and vertically by a factor of two. This "shrink" mode is useful when you want

to see a larger part of the image at once. One drawback of shrinking the image like this is that some detail is lost.

To load a new Mac file, press L at the menu. You will then be prompted for a filename. If you do not specify an extension, .MAC will be used automatically. The file will then be loaded into memory. Once loaded, the upper left corner of the picture will be displayed. At this point the arrow keys can be used to scroll around the entire Mac image. The CLEAR key can be used to toggle between the present display mode and the shrink mode. This is useful if you want to see the image from a broader perspective. The compressed image will begin from the same position as the uncompressed image. Although the arrow keys will still function in the shrink mode, it takes much longer to update the screen in this mode. For this reason it is recommended that you position the image while in the full size display mode and then switch to the shrink mode when you want to see the compressed view. While in the shrink mode, pressing the number keys 1 through 4 will alter the contrast of the image. Whenever a new file is loaded this value is reset to 2.

At some point you may find yourself with a Mac file that has been shifted horizontally, perhaps to align it with the right-hand border of another computer with a higher resolution screen. As a result the left and right borders of the image will appear to meet at some point in the middle of your viewing area. By pressing the SHIFT and left arrow or SHIFT and right arrow keys, you may be

able to shift this discontinuity until it disappears.

Pressing the space bar at any time will return you to the menu. You can use the space bar to toggle between the menu and the picture. If you want to save whatever is on the current PMODE4 screen, you can press S at the menu. You will be prompted for a filename, and the graphics screen will be saved to disk as a standard binary file. If you do not specify an extension, .BIN will be used automatically.

You can call up a directory by pressing D at the menu. After the directory is displayed, the computer will pause for you to press any key and then return to the menu. To quit the program, press Q. Ending this way is recommended; the computer's memory will be freed up, allowing you to load in another program without crashing the computer. Also, the drive head will be returned to Track 0 for those drives that suffer from the "head-banging" problem.

MacView can be used on cassette-based systems with a few minor modifications. These mostly involve changing the device number from '1' to '-1.' The EXEC in Line 880 should be eliminated, and Line 1040 should be changed to 1040 EXEC E, -1. Of course the usual modifications, like changing SAVE to CSAVE and so on, should be made. Also, the cassette files of *Mac* data should be in segmented format to work properly with this program. Although cassette operation is possible, it is not very practical due to the large size of Mac files. Disk operation is recommended. □

Al Elmer is a physics student at McMaster University. In his spare time he enjoys tinkering with electronics and programming the CoCo, for which he is especially interested in making graphics applications.

Editor's Note: Due to the size of Macintosh files, we are unable to include samples on this month's RAINBOW ON TAPE and DISK. However, several files are available in the Graphics Database in the CoCo SIG on Delphi. Simply download the files and save them to disk. Then run MacView.

✓ 150	.....217	590	.....232
300	.....193	870	.....3
450	.....233	END	.....63

The listing: MACVIEW

```

1 'macpaint file viewer
2 '   for the coco ii
3 '   (c) al elmer
4 '   ø3-11-88
10 DATA 34,1,BD,B2,23,BD,B3,ED
20 DATA D7,6F,30,8D,1,CA,9F,F3
30 DATA 8E,2,80,8D,39,30,1F,26
40 DATA FA,8D,33,81,7F,22,17,4C
50 DATA 97,FB,9E,F3,8D,28,43,A7
60 DATA 80,8C,FE,0,24,2C,A,FB
70 DATA 26,F2,9F,F3,20,E3,40,4C
80 DATA 97,FB,8D,12,43,9E,F3,A7
90 DATA 80,8C,FE,0,24,14,A,FB
100 DATA 26,F5,9F,F3,20,CB,B7,FF

```

```

110 DATA DE,BD,A1,76,1A,50,B7,FF
120 DATA DF,39,7F,FF,40,F,F6,F
130 DATA F7,B7,FF,DE,86,FE,97,FC
140 DATA 86,42,97,77,86,28,97,76
150 DATA F,FD,35,81,34,1,1A,50
160 DATA B7,FF,DF,17,0,BF,B7,FF
170 DATA DE,CC,FF,FF,FD,1,55,FD
180 DATA 1,57,AD,9F,A0,0,27,FA
190 DATA 81,5E,26,8,96,F7,27,E9
200 DATA A,F7,20,DC,81,A,26,A
210 DATA 96,F7,91,77,24,DB,C,F7
220 DATA 20,CE,81,8,26,8,96,F6
230 DATA 27,CF,A,F6,20,C2,81,9
240 DATA 26,A,96,F6,91,76,24,C1
250 DATA C,F6,20,B4,81,20,26,2
260 DATA 35,81,81,C,26,22,3,FD
270 DATA 86,28,97,76,86,42,97,77
280 DATA D,FD,27,9C,86,4,97,76
290 DATA 86,2A,97,77,96,F7,81,2A
300 DATA 23,8E,86,2A,97,F7,20,88
310 DATA 81,15,26,17,B7,FF,DF,30
320 DATA 8D,0,DD,CC,65,40,EE,1
330 DATA EF,81,83,0,1,26,F7,30
340 DATA 1E,20,17,81,5D,26,1A,B7
350 DATA FF,DF,30,8D,CB,41,CC,65
360 DATA 40,EE,83,EF,1,83,0,1
370 DATA 26,F7,86,FF,A7,1,16,FF
380 DATA 4F,81,31,10,25,FF,52,81
390 DATA 34,10,22,FF,4C,84,7,40

```

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One-Liner Contest Winner . . .

Here's one for SF fans. This one-liner draws a 3-D image on a background of stars and plays the intro to the movie 2001.

The listing:

```

1 A=RND(256):B=RND(191):PMODE4:S
  CREEN1:PSET(A,B):LINE(0,0)-(0,19
  1),PSET:LINE-(256,191),PSET:IFX>
  254ORY>190THENPLAY"O2L2B-O3FL2.B
  -O4L16DL1D-P8P4P2O2L2B-O3FL2.B-O
  4L16DL1D-P8P4P2P1O2L2B-O3FL2.B-O
  4L16DL1E-"ELSELINE(0,Y)-(X,191),
  PSET:Y=Y+10:X=X+10:GOTO1

```

Kevin J. Gross
Akron, PA

(For this winning one-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape*.)


```

400 DATA 97,FC,16,FF,3B,86,C0,97
410 DATA FA,96,F7,C6,48,3D,58,49
420 DATA 58,49,58,49,30,8D,0,88
430 DATA 30,8B,96,F6,33,86,D,FD
440 DATA 26,35,10,DF,F8,10,DE,BA
450 DATA 32,66,37,36,34,36,32,6C
460 DATA 37,36,34,36,32,6C,37,36
470 DATA 34,36,32,6C,37,36,34,36
480 DATA 32,6C,37,36,34,36,EC,C4
490 DATA ED,66,32,6E,33,C8,2A,A
500 DATA FA,26,D7,10,DE,F8,39,9E
510 DATA BA,86,20,97,FB,86,2,97
520 DATA F3,A6,C0,97,FE,A6,C8,47
530 DATA C6,4,D7,F4,5F,48,C9,0
540 DATA 48,C9,0,8,FE,C9,0,8
550 DATA FE,D9,FC,69,84,A,F4,26
560 DATA EB,A,F3,26,DC,30,1,A
570 DATA FB,26,D2,33,C8,50,A,FA
580 DATA 26,C7,39,BE,C0,6,6F,84
590 DATA AD,9F,C0,4,7F,FF,40,39
700 PCLEAR4:Pmode4:FILES1,0
710 CLEAR 50,12689:E=12690
720 CLS:PRINT"just a sec...":C=0
730 FOR K=E TO E+471
740 READ A$:A=VAL("&H"+A$):POKEK
,A:C=C+A
750 NEXT K
760 IF C<>56331 THEN PRINT"bad n
ews - this copy is no good":END
770 CLS:PRINT@8,"macpaint viewer
":PRINT@47,"by":PRINT@76,"al elm
er"
780 PRINT@166,"(L)oad a file"
790 PRINT@230,"(S)ave a pmode 4
screen"
800 PRINT@294,"(D)ir"
810 PRINT@358,"(Q)uit"
820 PRINT@453,"<space> to view s
creen"
830 A$=INKEY$:IF A$="" THEN 830

```

```

840 IF A$="L" THEN GOSUB 10000
850 IF A$="S" THEN GOSUB 20000
860 IF A$=" " THEN GOSUB 30000
870 IF A$="D" THEN CLS:DIR:EXEC4
4539:A$=INKEY$:GOTO 770
880 IF A$="Q" THEN EXEC E+459:CL
EAR2000,32000:CLS:PRINT">>burp!<<
":END
890 GOTO 770
10000 CLS:INPUT"load filename";F$
1010 IF INSTR(F$,".")=0 THEN F$=
F$+".MAC"
1020 CLS:PRINT"uncrunching ";F$
1030 OPEN"I",#1,F$
1040 EXEC E,1
1050 CLOSE#1:SCREEN1,1
1060 EXEC E+116
1070 RETURN
20000 CLS:INPUT"save filename";F$
2010 IF INSTR(F$,".")=0 THEN F$=
F$+".BIN"
2020 CLS:PRINT"saving pmode4 fil
e ";F$
2030 S=256*PEEK(186)+PEEK(187)
2040 SAVEM F$,S,S+6143,44539
2050 RETURN
30000 SCREEN1,1
3010 EXEC E+116
3020 RETURN

```

One-Liner Contest Winner

This short program is a random graphics generator that creates geometric patterns with DRAW strings.

The listing:

```

0 DATAU,D,L,R,E,F,G,H:FORC=1TO9:
READC$(C):NEXT:FORZ=1TO19:S$=S$+
C$(RND(8))+STR$(RND(4)):NEXTZ:PM
ODE3,1:SCREEN1,0:C$=STR$(RND(3)+
1):DRAW"C"+C$:FORS=1TO60STEP2:FO
RA=0TO3:DRAW"BM127,9S;A"+STR$(A)
+"S"+STR$(S)+S$:NEXTA,S:S$="":RU
N

```

Mike Sims
Nanuet, NY

(For this winning one-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape*.)

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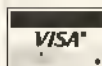
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*Add embedded printer commands
to Write III*

Write III *Plus*

By Larry E. Bates

When I saw the CoCo 3's 80-column screen, I instantly thought of word processors and began to look for one that would use 80 columns. Everything on the market, though, was at least \$80; after just buying a new computer, I couldn't afford that. Then I found the April '87 issue of RAINBOW, which featured *Write III*, a word processor written in BASIC. Bill Cook's program was great for most uses, but it didn't allow embedded printer commands. With a few changes, it can compete with commercial programs.

Load or type in *Write III* [April '87, Page 156], and then make the changes shown in Listing 1. The lines are num-

bered so that they will merge without renumbering the original. To center text, type ;CT and then your text. To make the text elongated, type ;CE instead. All other printer commands can be made by pressing the SHIFT and CLEAR keys, followed by the appropriate number below:

0= Underline On	1= Underline Off
2= Bold On	3= Bold Off
4= Elongate On	5= Elongate Off
B1= Italics On	B0= Italics Off

These codes are for a DMP-130. If you have another kind, just change the CHR\$ codes to match your printer. Once the changes have been made, run the program as usual.

(Questions or comments concerning this program may be directed to the author at 5348 Queens Ave. NE, Keizer, OR 97303. Please enclose an SASE when requesting a reply.) ☐

Larry Bates is an electronic technician who has been programming for six years. He and his wife have two children who love their dad's new CoCo.

Editor's Note: The complete modified version of Write III will be presented on this month's RAINBOW ON TAPE and DISK.

The listing: WRITE3+

```
6 ' PRINTER CODES: \0 & \1=UNDERLINE ON & OFF \2 & \3=BOLO ON & OFF
\4 & \5=ELONGATE ON & OFF
\B1 & \B0=ITALICS ON & OFF
7 ' ;CT WILL CENTER A LINE OF TEXT. ;CE WILL CENTER OF LINE OF ELONGATED TEXT. ;LM=LEFT MARGIN ;RM=RIGHT MARGIN ;SP=SPACING ;LP=LINES/PAGE
8 ' ;N=NEW PAGE
9 CT$=STRING$(80,CHR$(32))
4171 A$=L$(NO):Z1$="!#$%&'()*+=1234567890:~@+;?/>.<,ABCOEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz\":LOCATE1,V:ATTR1,1:PRINTA$;:IFH=0THENH=1:GOSUB37 ELSE GOSUB37
5004 LM=10:RM=10:LG=80-LM-RM:LP=55:PG=0:L1=0:SP=1:BF=0:B$="":LF=0:UL=0
5021 X1=INSTR(A$,"\\"):IFX1=0THEN 5030
5022 IF MID$(A$,X1+1,1)="0" THEN MID$(A$,X1,2)=CHR$(0)+CHR$(15)
```

```
ELSE IF MID$(A$,X1+1,1)="1" THEN MIO$(A$,X1,2)=CHR$(0)+CHR$(14) ' UNDERLINE ON & OFF
5023 IF MID$(A$,X1+1,1)="4" THEN MID$(A$,X1,2)=CHR$(27)+CHR$(14) ELSE IF MID$(A$,X1+1,1)="5" THEN N MID$(A$,X1,2)=CHR$(27)+CHR$(15) ' ELONGATE ON & OFF
5024 IF MID$(A$,X1+1,1)="2" THEN MID$(A$,X1,2)=CHR$(27)+CHR$(31) ELSE IF MID$(A$,X1+1,1)="3" THEN N MID$(A$,X1,2)=CHR$(27)+CHR$(32) ' BOLD ON AND OFF
5025 IF MID$(A$,X1+1,1)="B" THEN MID$(A$,X1,1)=CHR$(27) ' ITALIC S ON & OFF
5029 GOTO5021
5057 IF LEN(B$)>LG THEN A$=B$:B$="":GOTO5030
5555 X=INSTR(A$,";CL"):IF X=0THEN N 5560
5556 IFLEN(A$)-3>=LG THENA$=MID$(A$,4):GOTO5030 ELSE C=(LG-LEN(A$)+4)/2:A$=MID$(CT$,1,C)+MID$(A$,4):GOTO5030
5560 X=INSTR(A$,";CE"):IF X=0THEN N5570
5561 IF LEN(A$)-3>=LG/2 THENA$=MID$(A$,4):GOTO5030
```

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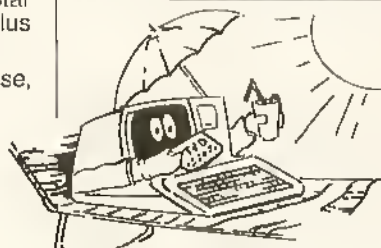
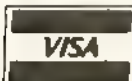
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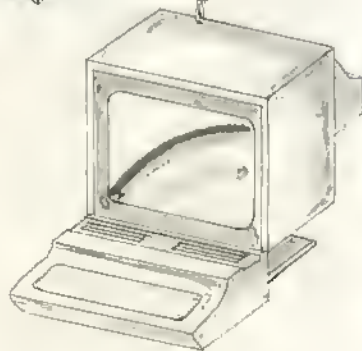
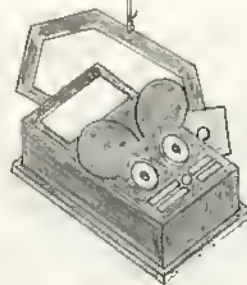
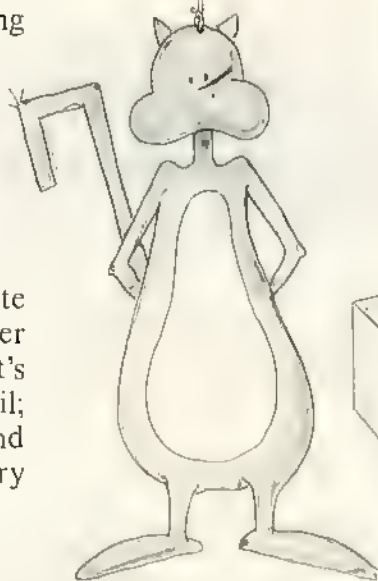
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The CoCo Mobile

It's the July issue again, and do you know what that means? Yes, it's our birthday! And as usual when it's our birthday, we give *you* a present. This year it's a mobile to hang in your computer corner — a CoCo Mobile, starring our favorite feline, CoCo Cat.

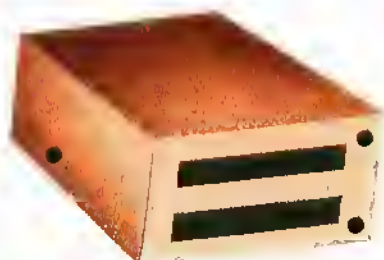
It's easy to assemble. Just cut out the seven items and punch small holes where indicated. Use an X-acto knife for cutting out the figures if you're not very handy with scissors, because extracting CoCo Cat from the page requires some delicate surgery. You don't need to cut out inner spaces, like the area inside CoCo Cat's arms or inside Maxwell Mouse's tail; doing so might disturb the balance and give you a lopsided mobile — very embarrassing.

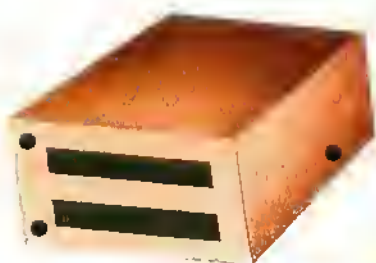
You'll need six pieces of string to tie it all together: a 7-inch, a 4-inch, a 3¼-inch, a 2½-inch, and two 6-inch pieces. Use the 4-inch piece to connect CoCo Cat to the leftmost hole in the RAINBOW header. The 7-inch piece connects the disk drive to the header's second hole; the 2½-inch and one of the 6-inch pieces connect the two disks to the drive. Maxwell Mouse connects to the third hole with the 3¼-inch piece, and the CoCo connects to the fourth and final hole with the 6-inch piece of string.



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The first in a series of tutorials for the beginner to intermediate machine language programmer

Machine Language Made BASIC

Part I: General Math

By William P. Nee

When I first started to learn machine language, setting up graphics seemed like a very complicated procedure. All those VDGs and SAMs were really discouraging. But then I realized that when you type in commands such as PMODE 4 or PCLS 2 or SCREEN 1,1, the computer must do something with those commands and numbers.

Why not find those same routines in ROM so you can just enter, for example, the PMODE numbers you want and then let the computer do all the work of setting the VDGs and SAMs? This series of articles is the result of several months of studying ROM routines to see where you can enter them, and it should help to make machine language programming a little more BASIC. These programs have been assembled with the EDTASM+ cartridge.

In the next 13 articles, we'll use machine language for basic math functions: RND, PRINT, PRINT USING, PMODE, PSET, LINE, PLAY, etc. We'll make a "dump" program for a seven-dot printer, create music with six voices and wind up with a 3-D rotation program that includes perspective. Most of the machine language programs will have either an explanation or a BASIC program listing for comparison.

Many of these programs are written for ease of understanding rather than for maximum speed. You will find places where you can cut down on the number of commands and refine the program. Just be sure you understand how the whole program works before modifying it. Thanks to Adrian Kotik for debugging the programs and proofreading and assembling the articles.

Machine language is not a complicated language, just different. Commands are written in an abbreviated format such as LD for Load, ST for Store, SUB for Subtract, etc. Most numbers are written in Hex format, using the numerical Base 16; however, EDTASM+ lets us use the more familiar Base 10, which we will be using in most of the programs. The \$ prefix will indicate an address or location in Hex; # indicates a Hex number; # indicates a Base 10 number.

Bill Nee reversed the "snowbird" trend by retiring to Wisconsin from a banking career in Florida. He spends the long, cold winters writing programs for his CoCo.

All examples and methods are based on using EDTASM+. Be sure the computer is turned off before inserting the cartridge. Examples will usually originate (ORG) at Hex Location \$3000 for compatibility with either a 16K or 32K computer. Each example will end with SWI, although to avoid the End Error message, you may add an extra line by pressing TAB, typing END, pressing TAB again and typing START. If you do, the line after the ORG line should begin with something like START. Any listing you want to save on tape should have END START as the last line of the program.

The following examples will show how to add, subtract, multiply, and divide using machine language.

Example 1: Put the number 5 into Register A. Store the contents of Register A in Location \$D0. Increase the contents of Location \$D0 by 1. Load Register A with the contents of Location \$D0. To put the program into memory, type A/IM/A0 and let the program list to check for any errors; press Z to go to ZBUG, then type G3000. To check the result, press R to examine the registers. Register A now contains 6. The command INC can be used to add the number 1 to registers A, B or a memory location.

Example 1A: In this example, we load Register A with the number 5 and add to Register A (ADDA) the number 4. After running the program, examine the registers to see the result of 9 in Register A.

Example 2: This time the DEC command is used. The results show that DEC can be used to subtract the number 1 from registers A, B or a memory location. The commands INC and DEC are useful for the counting portion of your programs; however, most math problems are a little more complicated than 1 + 1.

Example 2A: The SUB command will subtract a number from Register A or Register B. In many cases, however, both registers A and B may contain numbers we need to use later.

The next six examples illustrate how to add, subtract, and multiply these two registers together.

Example 3: Load registers A and B with different numbers, save Register B in the S stack (PSHS B), add to Register A the contents of the S stack and increase the S stack pointer by 1 back to its original location (ADDA, S+). When we look at Register A we see that it contains F instead of 15. This

is the computer's way of displaying numbers in Base 16, or Hex. In Base 16, 10=A, 11=B, 12=C, 13=D, 14=E, 15=F and 16=10. So our answer of "F" is correct.

Example 4: The same procedure is used to subtract Register B from Register A.

Example 5: Another subtraction problem, but now when we look at Register A we see FB, not -5. The computer doesn't recognize negative numbers, it merely counts backwards from zero. The highest number that can be put into registers A or B is 255, or \$FF. Counting backwards from zero in Base 16 you get \$FF, \$FE, \$FD, \$FC, \$FB, \$FA, etc. The fifth number counting backwards from zero is \$FB, so -5=\$FB.

Wait a minute — isn't \$FB also a positive number? Yes, in Base 10 it is $(F*16)+B$, or $(15*16)+11=251$. How does the computer — or operator — know which number is correct? In most math operations the computer will use "signed" numbers. If the left-most bit of an 8- or 16-bit number written in Base 2 is a 1, the number is considered to be negative; if it is a zero, the number is positive. So in registers A or B, numbers that appear to be greater than 127 may actually be negative numbers for math purposes.

In Example 5 our answer was \$FB. Since \$FB is greater than 127, we know the answer is actually a negative number. To use the "signed number check" you must convert \$FB in Hex to 11111011 in Base 2. (An easy way to convert Hex numbers to the Base 2 is to convert one Hex digit at a time. \$F equals 15, or 1111 in the Base 2; \$B equals 11 or 1011 in the Base 2, so \$FB=11111011.)

To prove that \$FB as a "signed" number is the same as -5, use the "Two's Complement" procedure. Write the number in Base 2, reverse all the 0s to 1s and all the 1s to 0s, then add 1. In doing so, 11111011 becomes 00000100, and adding 1 gives us a result of 00000101. This equals 5, so our answer is -5!

Example 6: This time we loaded registers A and B each with a number and used MUL to multiply them. Since the result could be greater than the space available in just one register, we must read registers A and B together all as one number. Registers A and B together are called Register D, although the D does not appear on the screen. Examine Register D (A and B) to find the answer \$32, which is $3*16+2$, or 50.

Example 7: In this example, we have to read all of Register D to find an answer of \$2710, which is $(2*16)**3 + (7*16)**2 + 1*16 + 0$, or 10000. (** is used here as a symbol for exponential.)

Example 8: Before we check the answer, an important point to remember is that MUL does not use "signed" numbers. So when we try to put in -100 or \$9C, the computer uses \$9C=156 and multiplies that by 100. The answer of Hex 3CF0 in Register D is 15600. Even larger numbers can be multiplied by using a ROM subroutine at Address \$9FB5.

Example 9: Load Register D with a Hex number and Register X with another Hex number. Jumping to the subroutine at \$9FB5 (ISR \$9FB5) will put the product of Register D times Register X in Register Y and Register U. If we read Register Y and Register U together, the product is \$06260060. You can check the result this time by converting the answer to the Base 10. Does this subroutine work with negative numbers?

So far, we've been working only with whole numbers, but that rarely occurs in math. The computer has two locations where it stores numbers up to nine digits long, including positive and negative numbers. These locations are called Floating Point Accumulator 1 and 2, or FPI and FP2. To

Example 1		Example 1A		Example 2	
DRG	\$3000	DRG	\$3000	DRG	\$3000
LDA	#5	LDA	#5	LDA	#5
STA	\$D0	ADDA	#4	STA	\$D0
INC	\$D0	SWI		DEC	\$D0
LDA	\$D0			LDA	\$D0
SWI				SWI	
Example 2A		Example 3		Example 4	
DRG	\$3000	DRG	\$3000	DRG	\$3000
LDA	#5	LDA	#10	LDA	#10
SUBA	#4	LDB	#5	LDB	#5
SWI		PSHS	B	PSHS	B
		ADDA	,S+	SUBA	,S+
		SWI		SWI	
Example 5		Example 6		Example 7	
DRG	\$3000	DRG	\$3000	DRG	\$3000
LDA	#5	LDA	#5	LDA	#100
LDB	#10	LDB	#10	LDB	#100
PSHS	B	MUL		MUL	
SUBA	,S+	SWI		SWI	
SWI					
Example 8		Example 9			
DRG	\$3000	DRG	\$3000		
LDA	#-100	LDD	#\$1234		
LDB	#100	LDX	#\$5678		
MUL		JSR	\$9FB5		
SWI		SWI			

get a "signed" number from Register D to FPI, use the ROM routine at Address \$B4F4; to get a number from FPI back to Register D, use the routine at \$B3ED. Remember, Register D can only hold a whole number.

Certain numbers already stored in the computer's memory that are used to perform internal calculations and their locations are:

Number	Location
-0.50	\$843C
0.25	\$BFC2
0.50	\$BEC0
1.00	\$BAC5
10.00	\$BB7D

Each number is five bytes long and is in floating point format.

To handle internal calculations, the computer has five ROM routines that add, subtract, multiply, or divide. The



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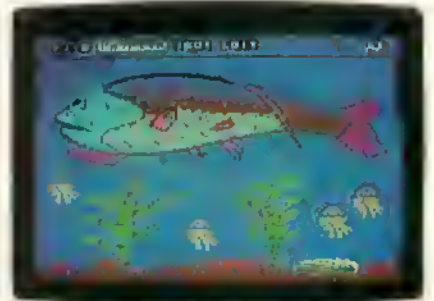
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symbol X means "the number at Location X." These routines are:

Function	Address
FP1=(X)+FP1	\$B9C2
FP1=(X)-FP1	\$B9B9
FP1=(X)*FP1	\$BACA
FP1=(X)/FP1	\$BB8F
FP1=FP2/(X)	\$BB88

Example 10: Load Register D with the number 6, put that in FP1 (JSR \$B4F4); load Register X with the location of the number 10 (LDX #\$BB7D), add the number at the location in Register X to FP1 (JSR \$B9C2). Transfer the result back to Register D (JSR \$B3ED). Examine the register to find Register D is Hex 10, or 16.

Example 11: Use the routine at \$B9B9 to subtract FP1 from the number at the location in Register X.

Example 12: The routine at \$BACA is used to multiply the number at the location in Register X by FP1. The answer of 3C in Register D is 60.

Example 13: The routine at \$BB8F divides the number at the location in Register X by FP1. Since Register D can only hold whole numbers, it shows a 1. The complete answer is in FP1, so we need a routine to display the entire answer instead of rounding it off to Register D. By using a combination of ROM routines, we can display the complete answer, including negative numbers, up to nine digits. (Putting a number back into Register D will lose the number in FP1.)

Example 13A: Type and run this example to see the entire

Example 10		Example 11		Example 12	
DRG	\$3000	DRG	\$3000	DRG	\$3000
LDD	#6	LDD	#6	LDD	#6
JSR	\$B4F4	JSR	\$B4F4	JSR	\$B4F4
LDX	#\$BB7D	LDX	#\$BB7D	LDX	#\$BB7D
JSR	\$B9C2	JSR	\$B9B9	JSR	\$BACA
JSR	\$B3ED	JSR	\$B3ED	JSR	\$B3ED
SWI		SWI		SWI	

Example 13		Example 13A	
ORG	\$3000	ORG	\$3000
LDD	#6	LDD	#6
JSR	\$B4F4	JSR	\$B4F4
LDX	#\$BB7D	LDX	#\$BB7D
JSR	\$BB8F	JSR	\$BB8F
JSR	\$B3ED	JSR	\$BDD9
SWI		LEAX	-1,X
		JSR	B99C
		JSR	\$B958
		SWI	



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answer displayed with all nine digits (and in the Base 10). The following routines are used in this example:

Function	Address
Transfer FP1 to a buffer at \$3DA	\$BDD9
Decrease location for sign	LEAX -1,X
Print buffer contents	\$B99C
Print a carriage return	\$B958

The main FP routines are:

Function	Address
Transfer FP1 to FP2 (and FP1)	\$BC5F
Transfer FP2 TO FP1 (and FP2)	\$BC4A
Register B (-128 to +127) to FP1	\$BC7C
Register B (-128 to +127) + FP1	\$BD99
Register D (-32768 to +32767) to FP1	\$B4F4
(X) to FP1	\$BC14
(X) to FP2	\$BB2F
FP1 to (X)	\$BC35
10*FP1	\$BB6A
-1*FP1	\$BEE9
FP1/10	\$BB82
FP2/FP1	\$BB91

Some other numbers stored in the computer's memory are:

Number	Location
-32768	\$B3DF
PI/2	\$83AB
2*PI	\$BFBD or \$BFE1
SQR(2)/2	\$8432
SQR(2)	\$8437
LOG(2)	\$8441

The \$B4F4 routine is used in most function commands. Once a number is in FP1, you can jump to the routine for any of the following:

Function	Location
SIN	\$BF78
COS	\$8378
TAN	\$8381
SQR	\$8480
EXP	\$84F2
LOG	\$8446
RND	\$BF1F
INT	\$BCCE

You can print the results in FP1 or use the routine at \$B3ED to put the results back in Register D, but only as a whole number. For practice, develop a machine language program that will print the SIN of any angle you load into Register D. Remember, angles must be converted to radians, since trigonometric functions in the Color Computer are in radians. (Hint: one degree = $2\pi/360$ radians.)

Now for our comparison programs. Both will perform a sort of numbers and graphics from screen locations &H400 to &H5FF. You may want to time each program. Is there a difference in the random portion? Is there much difference in the sorting portion? We will review these programs in the next article. Meanwhile, try making up your own programs using the ROM routines we've discussed.

(Questions or comments concerning this tutorial may be directed to the author at Route 2, Box 216C, Mason, WI 54856-9302. Please enclose an SASE when requesting a reply.) □

Listing 1: SORTBAS

```
110 CLS
120 FOR X=&H400 TO &H5FF
130 POKE X,RND(255)
180 NEXT
200 FLAG=1
220 FOR X=&H400 TO &H5FE
230 A=PEEK(X):B=PEEK(X+1)
```

```
250 IF A<=B THEN 300
270 TEMP=A:A=B:B=TEMP
280 POKE X,A:POKE X+1,B
290 FLAG=0
300 NEXT
320 IF FLAG=0 THEN 200
340 A$=INKEY$:IF A$="" THEN 340
370 END
```

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Listing 2: SORTBIN

```

30000
30000 BD A928 00100 ORG $30000
30003 108E 0400 00110 START JSR $A928 110 CLS
30007 CC 00FF 00120 LDY #$400 120 FOR X=&H400 TO &H5FF
3000A BD B4F4 00130 LOOP1 LDD #255 130 POKE X,RND(255)
3000D BD BF1F 00140 JSR $B4F4
30010 BD B3ED 00150 JSR $BF1F
30013 E7 A0 00160 JSR $B3ED
30015 108C 05FF 00170 STB ,Y+
30019 23 EC 00180 GMPY #$5FF 180 NEXT
3001B 86 01 00190 BLS LOOP1
3001D B7 3040 00200 LDA #1 200 FLAG=1
30020 8E 0400 00210 STA FLAG
30023 EC 80 00220 LDX #$400 220 FOR X=&H400 TO &H5FE
30025 34 04 00230 LOOP2 LDD ,X+ 230 A=PEEK(X):B=PEEK(X+1)
30027 A1 E0 00240 PSHS B
30029 23 07 00250 GMPA ,S+ 250 IF A<=B THEN 300
3002B 1E 89 00260 BLS CONT
3002D ED 1F 00270 EXG A,B 270 TEMP=A:A=B:B=TEMP
3002F 7F 3040 00280 STD -1,X 280 POKE X,A:POKE X+1,B
30032 8C 05FE 00290 CLR FLAG 290 FLAG=0
30035 23 EC 00300 GMPX #$5FE 300 NEXT
30037 7D 3040 00310 BLS LOOP2
3003A 27 DF 00320 TST FLAG 320 IF FLAG=0 THEN 200
3003C BD ADFB 00330 BEQ SORT
3003F 3F 00340 JSR $ADFB 340 A$=INKEY$:IF A$="" THEN 340
3040 00350 SWI
30000 30000 00360 FLAG RMB 1
00000 00370 END START 370 END
TOTAL ERRORS

```

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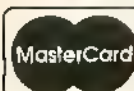
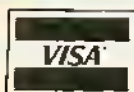
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**PLEASE CIRCLE
TAPE or DISK**

*A program to help you keep track of
voting at this year's political
conventions*



Convention!

By Leonard Hyre



Unpack the bunting, inflate the balloons, shred the confetti and rehearse the music for "Happy Days Are Here Again" and "Hail to the Chief"! Post the No Vacancy signs, tidy the public areas and lower the air conditioner thermostats! Atlanta and New Orleans are checking off these and countless other items on their things-to-do lists as the Democratic and Republican National Conventions head south.

Amid the hype and hoopla — not to mention the fun of watching convention delegates from across the United States and its territories and possessions revert to silly behavior they probably haven't practiced since they were teenagers — Americans will gather in front of their television sets to witness that quadrennial rite of presidential politics: choosing the nominees. This convention season promises to be the most exciting one in years, with the identity of at least one of the nominees, as well as both running mates, still uncertain as we go to press.

In anticipation of the Democrats' meeting July 18th through 21st and the Republicans' from the 15th until the 18th of August, *THE RAINBOW* is pleased to present Leonard Hyre's program *Convention*. We think you'll find it not only an intriguing way of testing your own predictive powers but also a means of involving the members of your family in a project that's fun as well as educational. For example, prior to the conventions each family member might predict state-by-state the number of votes a particular candidate will garner; these predictions could be printed out and used for comparison with the actual outcome of the convention voting, with some sort of prize for the winning political prognosticator. Or, on a more elementary level, you might want to use the program's delegate count as a tool for teaching younger family members something about state sizes in terms of population.

However you choose to use it, *Convention* is guaranteed to stimulate your own and your family's interest in the selection of each party's nominees for the 41st president and vice president of the United States. And be sure to watch for the November *RAINBOW*, where we'll feature a follow-up article and another timely Hyre program — *Election!*

Wild, unpredictable, exasperating, exhilarating, and one thing for sure — it's an American original. We can only be talking about one thing, the political convention. Not perfect, to be sure, but assuredly the best way of picking a leader that this nation has come up with so far!

Comes the Republican or Democratic convention, many of you, like me, will find yourselves glued in front of the television, immersed in American politics. This program, *Convention*, is written with the thought of adding some extra enjoyment to that viewing.

First and foremost, *Convention* keeps track of the votes. After all, that is the name of the game. A state's vote for each candidate is entered during the state roll calls. The program keeps track of total votes per candidate and votes per state per candidate, prints out detailed round-by-round reports, saves the data at any point and allows reloading of previously saved files.

After the title screen, the user selects either Democratic or Republican party, then is presented with the main menu. Three options are given the user.

The first option is Enter Votes; naturally, this is the heart of the whole program. You will be asked to enter a state or territory by abbreviation. Candidates' names are constantly displayed down the left side of the screen. When a state is selected, votes for each candidate are shown in the middle column as a grand total and to the right as his votes from this state. As state votes change, both columns will be updated. To exit the voting section, just enter XX at the state prompt. You will be returned to the main menu.

Output to the printer is the subject of the second option on the main menu. Two choices are given. The first choice is for a complete detailed report. This printout will list all of the states and territories and show votes given for each candidate across the sheet. After all states and territories are listed, a vote total is printed, followed by a legend relating candidate numbers to specific candidates. In addition, a printout of

the states and territories with their proper abbreviations is included. The other printer option is strictly for a list of states and abbreviations. This will likely be used only once, to print yourself a handy reference to work with. Choice 3 will again return you to the main menu.

"Prior to the conventions each family member might predict state-by-state the number of votes a particular candidate will garner; these predictions could be printed out and used for comparison with the actual outcome of the convention voting."

File saving and retrieving is the third choice offered. It might be interesting to save the voting status at various points in the proceedings — for example, after each roll call is completed. You may choose to save the file at any point, however. Data saved includes title, party choice and all votes per candidate per state. At any time you want, you can load the data back into memory for further rounds of voting, or for reports.

I have included lists with all the contending Republican and Democratic leaders. If you would like to follow along with the vice presidential selection process, simply change the DATA lines listing candidates to reflect the new contenders. For ease of modification, make sure each list contains six entries, even if some are "None" or "Other." My suggestion is that you put copies of the program on two separate disks, Democrat and Republican.

The program structure of *Convention* revolves around the basic problem of controlling "who has how many votes and from which state did they come." The two-dimension array $V(6, 53)$ represents votes (candidates, states and territories), and is the key to the whole program. For those of you new to computing and interested in learning

programming in BASIC, the manipulation of this array in the program offers a practical example of usage of multi-dimensional arrays.

To make understanding the program easier, I have tried to provide explanatory REM statements within the listing. A red, white and blue title screen seemed appropriate, so the first few lines of the program handle that task. All necessary DATA statements are then read into computer memory. The "working" screen is then created (lines 700 through 800) and a menu presented (lines 830 through 900). A small but important subroutine to clear the input and menu areas is located at lines 930 through 940.

Printer routines are very generic and should run on most any printer without causing problems. Lines 980 through 1380 encompass all printer functions. These lines are self-explanatory and should be easy to follow in the listing.

Vote entry and processing is handled by two routines, the first being state selection. Lines 1420 through 1490 get the state abbreviation, check it for validity and update that state's vote per candidate column. Vote entries are controlled with lines 1530 through 1610. The candidate's "old" number of votes from the current state is subtracted (Line 1550) prior to adding the "new" vote (Line 1590).

Very simple load (lines 1750 through 1850) and save (lines 1890 through 1960) routines handle all of the input/output of voting data. [See the Editor's Note that appears before the listing for modifications for cassette use.] You may assign filenames of your choice, but do not include an extension. Line 1810 in the load routine makes sure you are not loading a Republican data file into a Democratic convention, and vice versa.

Typing in *Convention* should not present too much of a challenge for you. Be very careful with the DATA statements, as errors here are often tricky to locate. Don't forget, the program is also available through Delphi and on RAINBOW ON TAPE and DISK.

Enjoy using *Convention* — I hope "your" candidate wins!

(Questions or comments concerning this program may be directed to the author at P.O. Box 403, Cambridge, MD 21613. Please enclose an SASE when requesting a reply.) □

Leonard Hyre is the author of Federal Hill Software's Handicapper series and a number of articles for RAINBOW. He also published several articles in RAINBOW's sister publication, PCM, and is the author of Sanyopoly, a new Sanyo game from Michigan Software.

Editor's Note: In order to run CONVENTN on a cassette-based system, delete lines 1770 and 1910 and substitute the following lines for those shown in Listing 1. For your convenience, the modified cassette version of CONVENTN will be included on this month's RAINBOW ON TAPE.

```

1790 OPEN "I", #-1, NM$
1800 INPUT #-1, SVFLAG
1810 IF SVFLAG <> FLAG THEN CLOS
E #-1: GOSUB 930:PRINT@96,"WRONG
PARTY...LOAD ABORTED";:FOR DL=1
TO 1200:NEXT DL:SOUND 150,1:GOT
O 800
1820 FOR CAND = 1 TO 6: FOR PL =
1 TO 53: INPUT #-1, V(CAND, PL)
: CT(CAND) = CT(CAND) + V(CAND,
PL): NEXT PL: NEXT CAND
1830 CLOSE #-1
1920 OPEN "O", #-1, NM$
1930 SVFLAG = FLAG: PRINT #-1, S
VFLAG
1940 FOR CAND=1TO6:FORPL=1TO53:P
RINT #-1,V(CAND,PL):NEXTPL:NEXTC
AND
1950 CLOSE #-1

```

✓ 175	.....218	1290	.....160
350	.....200	1350	.....108
590	.....87	1540	.....165
770	.....34	1670	.....117
1000	.....81	1820	.....22
1120	.....96	END	.....128

The listing: CONVENTN

```

10 *****
20 '* CONVENTION- *
30 '* AN AMERICAN ORIGINAL *
40 '* (C) 1988 BY L. HYRE *
50 '* CAMBRIDGE, MD, USA *
60 *****
70 '
80 ' ***** COCO VERSION *****
90 '
100 '*** PROGRAM INITIALIZE ***
110 '
120 DIM LS$(53), S$(53), S(53),
C$(6), C(6), V(6, 53), RC$(6), D
C$(6), TEST$(53)
130 FLAG = 0
139 '
141 '
150 CLS5:PRINT STRING$(64,175);

```

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```

160 RD$=CHR$(159)+CHR$(159):WH$=
CHR$(207)+CHR$(207)
165 BN$=RD$+WH$+RD$+WH$+RD$+WH$+
RD$+WH$:BN$=BN$+BN$
170 FOR X=1 TO 13:PRINT BN$;:NEX
T
172 GR$=STRING$(12," ")
174 PRINT@170,GR$;:PRINT@202,GR$
;CHR$(128);:PRINT@234,GR$;CHR$(1
28);:PRINT@266,GR$;CHR$(128);:PR
INT@298,GR$;CHR$(128);
175 PRINT@331,STRING$(12,128);
176 PRINT@203,"CONVENTION";:PRIN
T@239,"AN";:PRINT@268,"AMERICAN"
;:PRINT@300,"ORIGINAL";
177 PRINT@496,"<PRESS ANY KEY>";
178 AK$=INKEY$:IF AK$=""THEN 178
250 '
260 '** READ IN STATES ETC **
270 '
280 DATA ALABAMA,AL,1,ALASKA,AK,
2,ARIZONA,AZ,3
290 DATA ARKANSAS,AR,4,CALIFORNI
A,CA,5,COLORADO,CO,6,CONNECTICUT
,CN,7
300 DATA DELAWARE,DE,8,DIST of C
OLUMBIA,DC,9,FLORIDA,FL,10,GEORG
IA,GA,11
310 DATA HAWAII,HI,12,IDAHO,ID,1
3,ILLINOIS,IL,14
320 DATA INDIANA,IN,15,IOWA,IO,1
6,KANSAS,KS,17,KENTUCKY,KY,18,LO
UISIANA,LA,19
330 DATA MAINE,ME,20,MARYLAND,MD
,21,MASSACHUSETTS,MA,22,MICHIGAN
,MI,23
340 DATA MINNESOTA,MN,24,MISSISS
IPPI,MS,25,MISSOURI,MO,26,MONTAN
A,MT,27
350 DATA NEBRASKA,NE,28,NEVADA,N
V,29,NEW HAMPSHIRE,NH,30,NEW JER
SEY,NJ,31
360 DATA NEW MEXICO,NM,32,NEW YO
RK,NY,33,NORTH CAROLINA,NC,34,N0
RTH DAKOTA,ND,35
370 DATA OHIO,OH,36,OKLAHOMA,OK,
37,OREGON,OR,38
380 DATA PENNSYLVANIA,PA,42,PUER
TO RICO,PR,43,RHODE ISLAND,RI,44
390 DATA SOUTH CAROLINA,SC,42,SO
UTH DAKOTA,SD,43,TENNESSEE,TN,44
,TEXAS,TX,45
400 DATA UTAH,UT,46,VERMONT,VT,5
7,VIRGINIA,VA,48,VIRGIN ISLANDS,
VI,49
410 DATA WASHINGTON,WA,50,WEST V
IRGINIA,WV,51,WISCONSIN,WI,52,WY
OMING,WY,53
420 '
430 '*** CANDIDATES ***
440 '

```

```

450 DATA DUKAKIS,JACKSON,GEPHARD
T,GORE,SIMON,OTHER
460 DATA ROBERTSON,BUSH,DOLE,KEM
P,HAIG,OTHER
470 '
480 '*** SETUP SCREEN HERE ***
490 '
500 PMODE 0:CLS
510 '
520 ' READ STATES & CANDIDATES
530 '
540 FOR X = 1 TO 53: READ LS$(X)
, S$(X), S(X): NEXT
600 FOR X = 1 TO 6: READ DC$(X):
NEXT: FOR X = 1 TO 6: READ RC$(
X): NEXT
610 '
620 PRINT@6,"C O N V E N T I O N
":PRINT STRING$(32,175);:PRINT@1
60,STRING$(32,159);
630 '***** CHOOSE CONVENTIONS
640 '
650 PRINT@64,"CHOOSE PARTY....":
PRINT"<D>EMOCRAT OR <R>EPUBLIC";
:INPUT PR$
660 IF PR$ = "D" OR PR$ = "d" TH
EN FLAG = 1: GOTO 740
670 IF PR$ = "R" OR PR$ = "r" TH
EN FLAG = 2: GOTO 750
680 GOTO 700
690 FOR X = 1 TO 6: C$(X) = DC$(
X): C(X) = X: NEXT: GOTO 760
700 FOR X = 1 TO 6: C$(X) = RC$(
X): C(X) = X: NEXT: GOTO 760
710 PRINT@193,"CANDIDATE":PRINT@
208,"TOTAL":PRINT@219,"STATE":SS
=224:FOR X=1 TO 6:PRINT@SS,C(X);
">";C$(X):SS=SS+32:NEXT
720 IF FLAG=1 THEN PRINT@480,"TO
TAL=4162 NEEDED=2082";
730 IF FLAG=2 THEN PRINT@480,"TO
TAL=2277 NEEDED=1139";
740 FOR DL=1 TO 490:NEXT:GOSUB 9
30
750 '
760 '*** MAIN MENU ***
770 '
780 PRINT@64,"SELECTION MENU..."
790 PRINT"1>VOTES 2>PRINTER 3>
SAVE/LOAD"
800 AK$ = INKEY$: IF AK$ = "" TH
EN 850
810 IF AK$ = "1" THEN 1420
820 IF AK$ = "2" THEN 980
830 IF AK$ = "3" THEN 1650
840 GOTO 850
850 GOTO 900
860 '
870 '*** CLEAR INPUT AREA ***
880 '
890 FOR WP=64 TO 128 STEP 32:PRI

```



```

NT@WP, STRING$(32, " ");:NEXT WP
940 RETURN
950 '
960 '*** PRINTER ROUTINES ***
970 '
980 GOSUB 930
990 PRINT@64,"PRINTED INFORMATION AVAILABLE.."
991 '
1000 PRINT@96,"<make sure printer is on>:PRINT@128,"1>REPORT 2>ST.ABBREV. 3>MENU"
1001 '
1010 AL$ = INKEY$: IF AL$ = "" THEN 1010
1020 IF AL$ = "1" THEN 1190
1030 IF AL$ = "2" THEN 1090
1040 IF AL$ = "3" THEN 800
1050 GOTO 1010
1060 '
1070 '* PRINT OUT STATES *
1080 '
1090 GOSUB 930: PRINT #-2, "Abbreviations Of States, Territories, and District Of Columbia.": PRINT #-2, STRING$(80, "-")
1100 FOR P = 1 TO 27
1110 IF P < 10 THEN PRINT #-2, "0"; RIGHT$(STR$(S(P)), 1); "> ";

```

```

S$(P); "-"; LS$(P); : PRINT #-2, TAB(40); S(P + 27); ">"; S$(P + 27); "-"; LS$(P + 27): GOTO 1130
1120 PRINT #-2, RIGHT$(STR$(S(P)), 2); "> "; S$(P); "-"; LS$(P); : IF (P + 27) = 54 THEN PRINT #-2, "": ELSE PRINT #-2, TAB(40); S(P + 27); ">"; S$(P + 27); "-"; LS$(P + 27)
1130 NEXT P
1140 IF TF = 1 THEN GOTO 1380
1150 GOTO 800
1160 '
1170 '*** PRINTER REPORT ***
1180 '
1190 GOSUB 930:PRINT@64,"PRINTER OPERATIONS.....":PRINT@96,"IS PRINTER READY <Y/N>";:INPUT YN$
1200 IF YN$ = "Y" OR YN$ = "y" THEN 1220
1210 SOUND 200,1:GOSUB 930:GOTO 830
1220 PRINT@128,"ENTER TITLE ";:INPUT RT$
1230 IF FLAG = 1 THEN PT$ = "DEMOCRATIC PARTY" ELSE PT$ = "REPUBLICAN PARTY"
1240 SR = 40 - INT(LEN(RT$) / 2)

```

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```

: PRINT #-2, STRING$(SR, " "); R
T$: PRINT #-2, STRING$(80, "_")
1250 PRINT #-2, PT$: "-Current C
ONVENTION Status Report-" : PRIN
T #-2, STRING$(80, "_")
1260 PRINT #-2, "CANDIDATES:":T
B=15:FOR X=1 TO 6:PRINT #-2,TAB(
TB+(9-LEN(C$(X))):C$(X):TB=TB+
10:NEXT X:PRINT #-2
1270 PRINT #-2, STRING$(80, "_")
1280 FOR REPORT = 1 TO 53
1290 PRINT #-2, LS$(REPORT); : P
RINT #-2, TAB(18); : PRINT #-2,
USING "####.#"; V(1, REPORT); :
PRINT #-2, TAB(28); : PRINT #-2,
USING "####.#"; V(2, REPORT); :
PRINT #-2, TAB(38); : PRINT #-2
, USING "####.#"; V(3, REPORT);
1300 PRINT #-2, TAB(48); : PRINT
#-2, USING "####.#"; V(4, REPO
RT); : PRINT #-2, TAB(58); : PRIN
T #-2, USING "####.#"; V(5, REPO
RT); : PRINT #-2, TAB(68); : PRI
NT #-2, USING "####.#"; V(6, REP
ORT)
1310 IF REPORT=45 THEN FOR SK=1
TO 15:PRINT #-2,"":NEXT SK
1320 NEXT REPORT
1330 PRINT #-2, STRING$(80, " ")
1340 PRINT #-2, "TOTAL VOTES=";
: PRINT #-2, TAB(18); : PRINT #-
2, USING "####.#"; CT(1); : PRIN
T #-2, TAB(28); : PRINT #-2, USI
NG "####.#"; CT(2); : PRINT #-2,
TAB(38); : PRINT #-2, USING "##
#.#"; CT(3);
1350 PRINT #-2, TAB(48); : PRINT
#-2, USING "####.#"; CT(4); : P
RINT #-2, TAB(58); : PRINT #-2,
USING "####.#"; CT(5); : PRINT #
-2, TAB(68);:PRINT #-2,USING "##
#.#";CT(6):PRINT#-2,STRING$(80,
" ")
1370 PRINT #-2, STRING$(80, "_")
: TF = 1: GOTO 1090

```

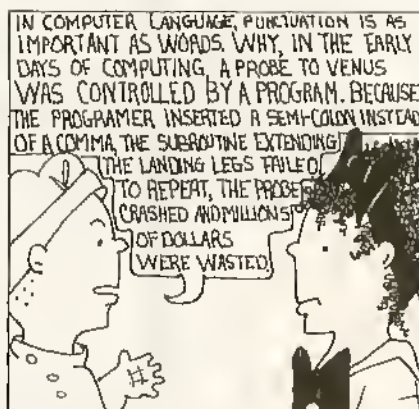
```

1380 TF = 0: FOR X=1 TO 26:PRINT
#-2,"":NEXT:GOSUB 930: GOTO 830
1390 '
1400 '***** GET STATE/TERRITOR
Y FROM USER
1410 '
1420 GOSUB 930:PRINT@64,"VOTE IN
PUT..":PRINT@85,"XX=MENU";:PRINT
@96,"INPUT STATE ABBREVIATION:";
:INPUT ST$
1440 IF ST$ = "XX" THEN GOSUB 93
0: GOTO 830
1450 FOR TEST = 1 TO 53: IF ST$
= S$(TEST) THEN 1480
1460 NEXT TEST
1470 PRINT@128,"INCORRECT ABBREV
IATION!-SEE LIST";:FOR DL=1 TO 1
500:NEXT:SOUND 100,1:GOTO 1420
1480 GOSUB 930:PRINT@64,"VOTES F
ROM ";LS$(TEST):S=TEST
1490 SS=250:FOR PRIOR=1 TO 6:PRI
NT@SS,:PRINT USING"####.#";V(PR
IOR,S):SS=SS+32:NEXT PRIOR
1500 '
1510 '*** GET VOTES ***
1520 '
1530 SS=241:FOR PASS = 1 TO 6
1540 PRINT@96,STRING$(32," ");:P
RINT@96,"VOTES FOR CANDIDATE ";C
$(PASS)
1550 CT(PASS) = CT(PASS) - V(PAS
S, S)
1560 PRINT@128,:INPUT "INPUT VO
TES:"; V(PASS,S)
1570 REM:IF VAL(STR$(V(PASS,S)))
=0 AND STR$(V(PASS,S))<>"0" THEN
SOUND 100,1:GOTO 1560
1590 CT(PASS)=CT(PASS)+V(PASS,S)
:PRINT@SS,:PRINT USING"####.#";
CT(PASS);:SX=SS+9:PRINT@SX,:PRI
NT USING"####.#";V(PASS,S):SS=S
S+32
1600 PRINT@128,STRING$(32," ");:
NEXT PASS
1610 GOTO 1420

```

Dr. Nibble

By Kelly Taylor




```

1620 '
1630 '*** SAVE/LOAD ROUTINE ***
1640 '
1650 GOSUB 930: PRINT@64, "DATA
SAVE/RETRIEVE MENU...."
1660 PRINT@96, "1>LOAD FILE 2>SAV
E FILE 3>MENU";
1670 LS$ = INKEY$: IF LS$ = " " T
HEN 1670
1680 IF LS$ = "1" THEN 1750
1690 IF LS$ = "2" THEN 1890
1700 IF LS$ = "3" THEN GOTO 800
1710 GOTO 1650
1720 '
1730 '*** READ IN FILE ***
1740 '
1750 GOSUB 930:PRINT@64,"FILE LO
AD ROUTINE....":PRINT@96,"ENTER
FILE NAME";:INPUT NM$
1760 IF LEN(NM$) > 8 THEN NM$ =
LEFT$(NM$, 7)
1770 NM$ = NM$ + ".CNV"
1780 FOR CAND = 1 TO 6: CT(CAND)
= 0: FOR PL = 1 TO 53: V(CAND,
PL) = 0: NEXT PL: NEXT CAND
1790 OPEN "I", 1, NM$
1800 INPUT #1, SVFLAG
1810 IF SVFLAG <> FLAG THEN CLOS
E 1: GOSUB 930:PRINT@96,"WRONG P

```

```

ARTY...LOAD ABORTED";:FOR DL=1 T
O 1200:NEXT DL:SOUND 150,1:GOTO
800
1820 FOR CAND = 1 TO 6: FOR PL =
1 TO 53: INPUT #1, V(CAND, PL):
CT(CAND) = CT(CAND) + V(CAND, P
L): NEXT PL: NEXT CAND
1830 CLOSE 1
1840 REM SS=224:FOR WP=1 TO 6:PR
INT@SS,STRING$(15," ");:SS=SS+32
:NEXT
1850 GOTO 800
1860 '
1870 '*** SAVE FILE ***
1880 '
1890 GOSUB 930:PRINT@64,"FILE SA
VE ROUTINE....":PRINT@96,"ENTER
FILE NAME";:INPUT NM$
1900 IF LEN(NM$) > 8 THEN NM$ =
LEFT$(NM$, 7)
1910 NM$ = NM$ + ".CNV"
1920 OPEN "O", 1, NM$
1930 SVFLAG = FLAG: WRITE #1, SV
FLAG
1940 FOR CAND=1TO6:FORPL=1TO53:W
RITE #1,V(CAND,PL):NEXTPL:NEXTCA
ND
1950 CLOSE 1
1960 GOTO 800

```

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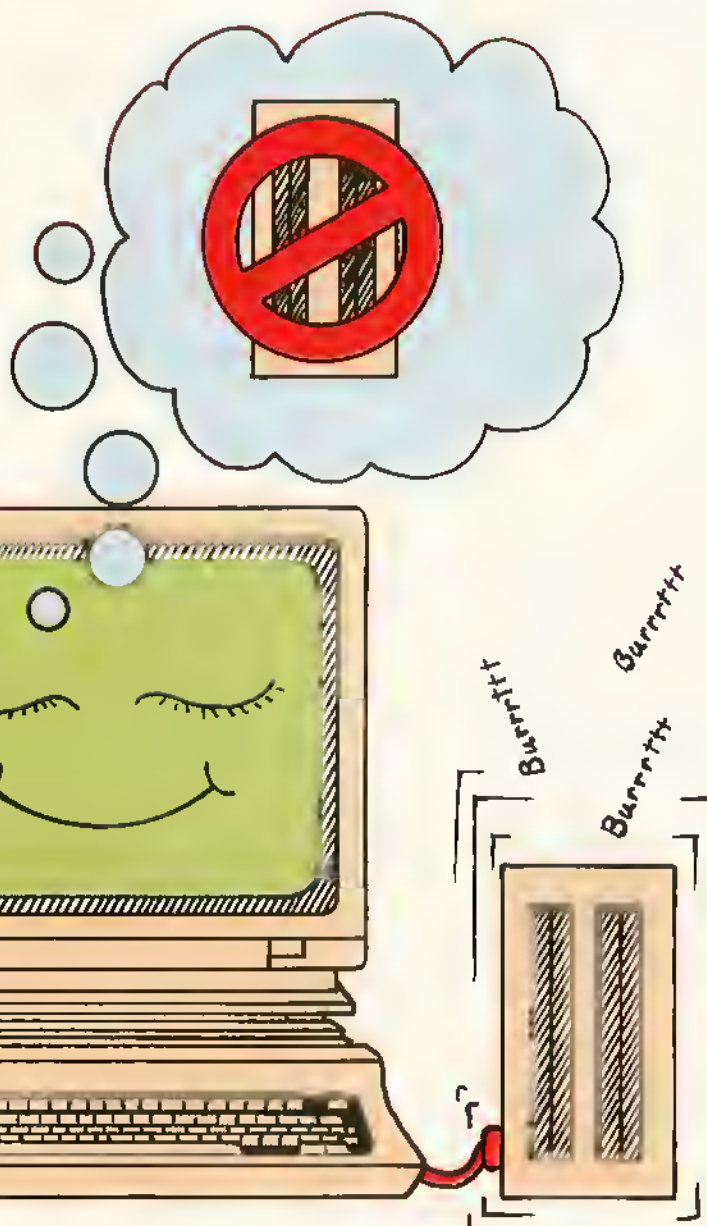




Free up more memory to run long programs without unplugging your disk drive

Erase All Trace!

By Jeremy Spiller



Some of the finest programs cannot be run with a disk controller plugged in. Some are simply too long; others, written on systems without a drive, use memory locations normally reserved for disk-operation storage of binary subroutines or data. This means, of course, that the program must be loaded from cassette, a rather tedious process if you bought a disk drive in order to avoid all the little inconveniences of loading from tape. Well, fret no more! If you have a 64K CoCo you no longer have to unplug your disk drive controller in order to load and run these programs. They can be loaded from disk directly into memory and then run with the disk drive still in place. One note is in order here: because of the vectors used, this program will only work with CoCo 1 and 2. It will not work on a CoCo 3.

Using the Program

After keying in the program, be *very sure* to save it before you run it. *Disk-Off* kills itself after running.

Assume that the long program you want to run is stored on disk. Most of these programs are too long to actually run with the disk controller plugged in, but there is usually enough room in memory to at least store them. Therefore, before you run *DiskOff*, load your long program into the computer (you may need to PCLEAR 1 first), and then store it on disk.

Now run *DiskOff*. At the prompt, type in the filename of your long program and press ENTER. The disk drive will turn on for one last time and load your long program into memory. When the cursor reappears, the computer has been fooled into thinking that disk BASIC does not exist. Type RUN and press ENTER; your program should run just as if the disk controller were not in place.

Jeremy Spiller is a high school junior who has been programming his CoCo for three years. He began using assembly language a year ago and learned the information needed for this program by disassembling parts of ROM.

How the Program Works

This program takes advantage of the fact that the computer allocates low memory for such things as graphics pages and disk buffer space at the time the computer is first turned on. The startup routine in ROM includes peeks in various locations to see what hardware is in place. If the disk controller card or a ROM pack is in the port, then locations &HC000 and &HC001 contain specific values. If the numbers in these locations are correct during the startup routine, the computer then assumes that a ROM pack or the disk drive controller is in place and executes the program contained in cartridge memory (&HC000 through &HFEFF). If the system is disk-based, then that program is Disk BASIC and includes reserving 2,048 bytes in low memory for use by the disk drive. These 2,048 bytes are located directly after the text screen memory and before the first graphics page reserved by Extended BASIC. It is the availability of these 2,048 bytes that makes it possible to run some programs only with the disk controller out of its slot. With no disk drive in place, the first graphics page starts directly after the text screen memory, leaving more room above the graphics pages for BASIC to operate and freeing up memory between &H600 and &HE00 for the user.

If, on the other hand, either of the first two bytes of the cartridge ROM is incorrect, the computer assumes there is no disk program to run; the startup routine goes on to initialize memory without making provisions for setting aside that critical 2,048 bytes in low memory. If it were somehow possible to load your BASIC program off disk into the correct position in memory, poke a zero into ROM Location &HC000 and then execute a cold start without losing your program, you could fool the computer into thinking that there was no drive controller in place. No space would be allocated to disk drive use, and more room would be made available to the user.

Unfortunately, it is impossible to poke anything into a ROM location other than what is already written there. On top of that, if you execute a cold start, you lose the BASIC program that you loaded off disk, right? Wrong!

If you have a 64K CoCo, you can in effect write into ROM. The trick is to copy ROM into high memory RAM and then revise it to your heart's content. The real problem comes when you try to run a cold start. Under normal circumstances, you may be operating in

64K mode with your revised software "ROM-twin", but as soon as you POKE 113,0 and then press the reset button as you would to produce a cold start, something nasty happens. The reset routine automatically switches the machine out of 64K mode (and your modified software ROM-twin) back into 32K (and the computer's hardware ROM) instead. (If you try to execute &HA027 with your software ROM-twin, your computer goes west and you'll have to power down to regain control.) A large part of *DiskOff* is devoted to overcoming this obstacle, as well as to restoring the BASIC program after the cold start is executed.

Program Nitty-Gritty

The data in lines 30, 50 and the last 11 bytes in Line 80 are three short machine language routines that are loaded into protected graphics memory in lines 40, 60 and 120. The first to be executed (Line 70) is the ever-popular program that transfers ROM into high-memory RAM two bytes at a time. After it accomplishes this task, it transfers control from the hardware ROM to its software twin in RAM before returning to *DiskOff*. Line 70 goes on to poke a zero into the first location in the ROM-twin. If a peek of that location returns a zero, then it is assumed that the transfer was successful and the original value is restored. If not, then it is assumed that you are still in hardware ROM, and that the computer is not equipped for 64K operation.

The next ML program stored in graphics memory is a routine that will restore the long BASIC program which will be loaded from disk just before the cold start. Bear in mind that while a cold start generally wipes out user access to BASIC programs previously stored in memory, the program itself remains largely intact provided the computer was not powered down. What *does* get destroyed are all references to the program in the lower 256 bytes of memory, namely memory locations 27 through 32 along with the first two bytes of the program itself. All of this information can be obtained by close inspection of the remains of the program after the cold start. RESTORE is designed to do this and to plug the correct values back into the correct memory locations.

Before covering the third ML routine poked into protected memory, we will look at the actual revisions that *DiskOff* makes in our software ROM-twin. (Please note that the only ML routine actually executed so far has been the

one that copied ROM into RAM. None of the other code is executed until after the disk drive has loaded the program that ordinarily cannot be run with the drive in place.)

Line 90 pokes a short bit of code into our ROM-twin, preventing the microprocessor from poking zeros into the last page in ROM. While this is part of a normal cold start, poking anything into some of these locations would switch the computer back to the hardware ROM, a situation we want to prevent.

Line 100 similarly pokes code to divert the microprocessor around other ROM instructions that would prevent BASIC from working properly if executed.

Line 110 plugs in a patch that diverts the microprocessor to the RESTORE routine stored in protected memory. RESTORE is executed after the cold start. Line 110 pokes code replacing the normal jump to the cursor routine in ROM.

Line 130 pokes 113,0, which flags for a cold start on a reset. It goes on to poke a zero in Location &HC000, tricking the computer into believing that there is nothing in the ROM port. Finally, it pokes 30 into Location 25, setting the start of BASIC to where it should be with no disk controller in place (2,048 bytes lower).

Lines 140 and 150 poke another message into the ROM locations that ordinarily code for the Microsoft copy-right message appearing whenever you power up or run a cold start.

Now the fun begins. We have transferred ROM into high RAM, modified its cold start routine to protect its integrity during the cold start and to trick it into believing that there is nothing in the ROM pack port, and added patches that will automatically divert the microprocessor to the RESTORE routine in low memory. The machinery is in place, but it hasn't been activated yet; and Disk BASIC is still in operation. We are still free to load our non-disk program off the disk.

Line 170 is the key to the auto-execution of the cold start. Note the two pokes. BASIC keeps a jump vector stored in locations &H168 and &H169. Whenever you load a program off disk, Disk BASIC first fetches the disk directory entry and then prints a carriage return (CHR\$(13)). It then loads the program (remember that Line 130 causes it to load 2,048 bytes lower than normal) and finally prints an "OK." Before each screen print, Disk BASIC looks at loca-

tions &H168 and &H169 to determine where its next set of instructions lie.

DiskOff changes the jump vector held in these locations and, in so doing, diverts the microprocessor to the COLD START TRIGGER, the third routine loaded by Line 120 into low memory. This program checks to see if the character to be printed is the carriage return. If it is, it sends the microprocessor back to load the program into memory. If the character is the "O" (in "OK"), then the program is assumed to be loaded; TRIGGER turns off the disk drive motor by poking a zero into

&HFF40, then diverts the microprocessor to our modified cold start by calling a jump to &HA027.

Now all the machinery that we put into place earlier is activated. Extended BASIC checks to see if there is anything in the cartridge slot. (Our zero in Location &HC000 tricks it into believing that there is not.) It then initializes RAM, jumping around the areas that would damage our ROM-twin. When it is finished, it is diverted to the RESTORE program, which scans the remains of our BASIC program to replace the missing information in low

memory. Finally, RESTORE returns control to BASIC by jumping to &HA0E2 (the cursor), and *voila!*

We are now back in Extended BASIC, with the program loaded into memory. At this point Disk BASIC is totally disabled, and any disk commands return a syntax error. Type RUN and play the game without having to remove the disk drive controller.

(Questions or comments concerning this program may be directed to the author at RFD 1, P.O. Box 1094, Townsend, MA 01469. Please enclose an SASE when requesting a reply.) □

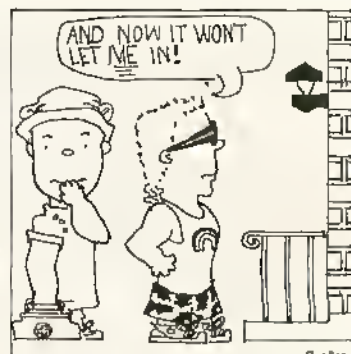
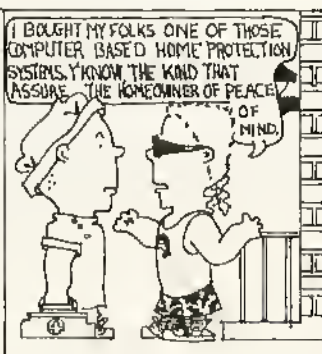
The listing: DISKOFF

```
1 *****
3 '*          DISKOFF          *
5 '*      BY JEREMY SPILLER    *
7 '*          1985             *
9 *****
10 CLS:PRINT"THIS PROGRAM WILL A
LLOW YOU TO LOAD AND RUN PROGRA
MS OFF YOUR DISK DRIVE WHICH NO
RMALLY CANNOT BE RUN WITH THE DIS
K CONTROLLER PLUGGED IN."
20 PRINT@172,"thinking"
25 'PATCH 1---RESTORE ROUTINE
30 DATA 5F,9E,19,1F,12,30,4,A6,8
0,26,FC,C1,0,26,3,AF,A4,5C,A6,84
,26,EF,30,2,9F,1B,9F,1D,9F,1F,7E
,A0,E2
40 C=0:FOR X=4000 TO 4032:READ A
$:A=VAL("&H"+A$):POKE X,A:C=C+A:
NEXT:IF C<>3329 THEN PRINT"ERROR
IN PATCH 1":STOP
45 'PATCH 2---ROM TO RAM ROUTINE
50 DATA 1A,50,8E,80,0,B7,FF,DE,E
C,84,B7,FF,DF,ED,81,8C,FF,0,26,F
1,1C,AF,39
60 C=0:FOR X=&HFC8 TO &HFDE:READ
A$:A=VAL("&H"+A$):POKE X,A:C=C+A:
NEXT:IF C<>3365 THEN PRINT"ERR
OR IN PATCH 2"
70 EXEC &HFC8:A=PEEK(&H8000):POK
E &H8000,0:IF PEEK(&H8000)=0 THE
N POKE &H8000,A ELSE PRINT"YOU M
UST HAVE 64K":STOP
```

```
75 'PATCH 3---ROM PATCHES & COLD
START TRIGGER
80 DATA E0,5F,7E,A0,5B,8E,7F,FF,
20,A,7E,F,A0,81,D,26,1,39,7F,FF,
40,7E,A0,27
90 C=0:FOR X=&HA053 TO &HA057:RE
AD A$:A=VAL("&H"+A$):POKE X,A:C=
C+A:NEXT
100 FOR X=&HA084 TO &HA088:READ
A$:A=VAL("&H"+A$):POKE X,A:C=C+A
:NEXT
110 FOR X=&H80BD TO &H80BF:READ
A$:A=VAL("&H"+A$):POKE X,A:C=C+A
:NEXT
120 FOR X=&HFFA TO &H1004:READ A
$:A=VAL("&H"+A$):POKE X,A:C=C+A:
NEXT:IF C<>2572 THEN PRINT"ERROR
IN PATCH 3":STOP
130 POKE 113,0:POKE &HC000,0:POK
E 25,30
140 A$="YOU ARE NOW IN EXTENDED
BASIC WITH YOUR PROGRAM IN THE
MEMORY.":A$=A$+STRING$(81-LEN(A
$),32)
150 P=&H80E8:FOR X=1 TO LEN(A$):
POKE P,ASC(MID$(A$,X,1)):P=P+1:N
EXT
160 FOR X=1 TO 20:PRINTCHR$(8);:
NEXT:PRINT:INPUT"ENTER PROGRAM N
AME":A$:CLS:PRINT"ONE SECOND PLE
ASE"
170 POKE &H168,&HF:POKE &H169,&H
FA:LOAD A$
```

Dr. Nibble

By Kelly Taylor



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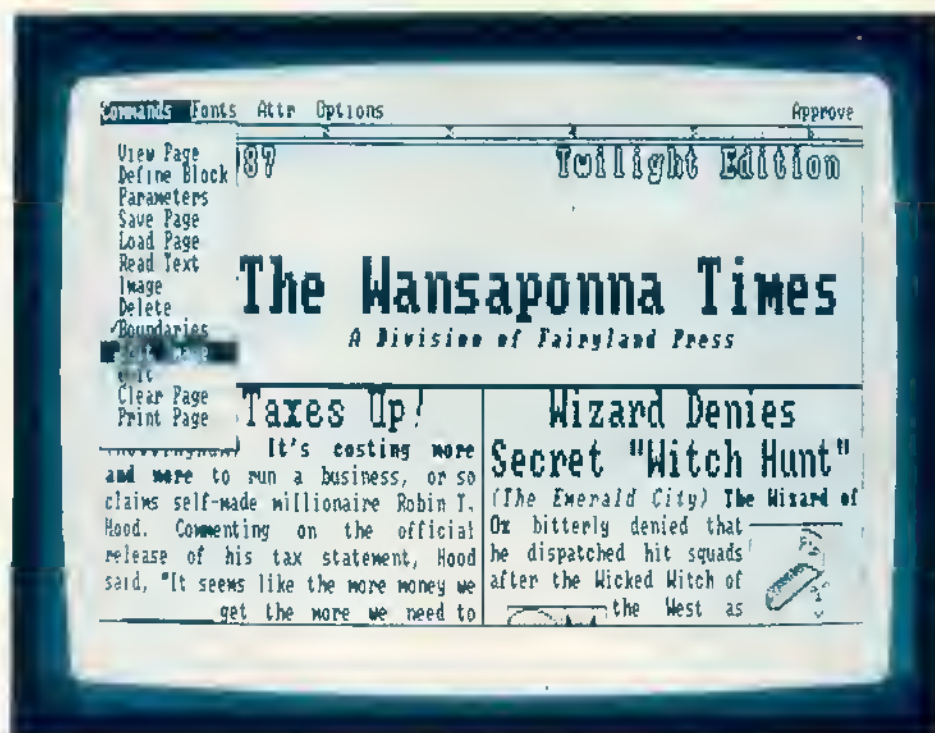
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Software

CoCo 3

Home Publisher — Getting the Word out on the CoCo 3

Tandy's *Home Publisher* is a desktop publishing program written especially for your CoCo 3. By combining detailed graphics and different sizes and styles of text on one page, you can produce high-quality newsletters, announcements, or any other type of small document using your computer and printer.

Written in OS-9 Level II (but you don't need OS-9 Level II to run it), the program requires at least one disk drive. A joystick or mouse would be a worthwhile addition, but is not required to run the program successfully. The disk is not copy-protected, so it's easy to make a backup for your own protec-

tion. You can also install the program on a hard disk.

The program loads with some rather complex instructions, having you type a few OS-9 commands, but the screen tells exactly what to do:

```
CHX /D0/CMDS ENTER
CHD /D0 ENTER
EX PUBLISH >/TERM</TERM
>>/TERM ENTER
```

512K users have a shortcut in that they can type EX PUBLISH as the last instruction, but 128K users must type the whole line each time they boot up. In

my opinion, a program of this caliber should be easier to access, having a configure program to create a boot file. More advanced programmers will likely develop their own boot files to prevent this extra typing.

If your disk controller is equipped with DOS 2.0 or earlier, you will not be able to start the program with the DOS command. However, the instruction book provides a short BASIC loader program that will boot the program.

Once the program has been loaded, you will see the high resolution work screen headed by a command line at the top. Here are some of the commands available: View Page; Define Block, which determines how your composition will be laid out; Parameters, which sets block and margin locations, font sizes, spacing and justification; Save/Load Page; Read Text, allowing you to read in standard ASCII text files; Image, which provides 37 drawings that

can be incorporated into your work; Delete; Boundaries; Edit Image; Quit; Clear Page; and Print Page.

The Fonts command yields a directory of 14 fonts; the ATTR command changes font styles (you can select from bold, outline, italics or shadowed letters). Under the Options command you define or change your system configuration for the following: printer double-strike mode, Hi-Res Joystick, RGB or composite monitor, foreground and background colors, system setup (initial block format in either one, two or three columns), default drives and directory, justification and printer (Tandy DMP or Epson RX-80).

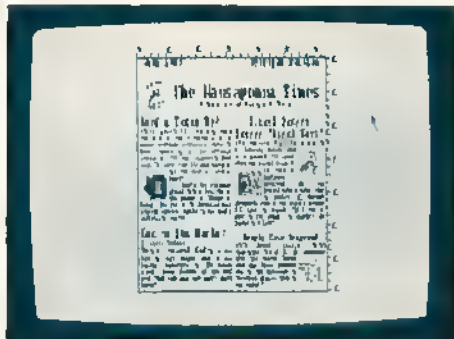
Only half of the page is visible on-screen even though the entire page is kept in memory. To see the other half, you must position the cursor to the extreme left of the workspace screen and press the joystick or mouse button. It is possible to see the entire page at any time through a previewing feature, but the page will not be completely readable. Previewing is useful because it allows you to see how your page looks before you commit to printing.

The use of multiple pop-up windows and menus makes *Home Publisher* very user-friendly. After about 30 minutes of computer use, I was able to create some pretty neat-looking newsletters. I do recommend the use of the Tandy Hi-Res Joystick Interface; it makes cursor operation smoother and is a must if you intend to edit any of the graphic images supplied on the disk. Although the 45-page instruction manual is well-written and easy to follow, most users will catch on quickly and not need the book other than for minor referencing.



I was disappointed that the program does not contain printer drivers for many of the other popular printers on the market, such as Star, Okidata and other models of Epson. I guess Tandy thinks that just because we own CoCo

3s, we must also own its DMP printers. My other complaint, as stated at the beginning of this review, is the complex way in which the program has to be loaded.



But, all in all, *Home Publisher* does what it is advertised to do, and it does it well. The price is reasonable and the results are gratifying.

(Tandy Corporation, 1700 One Tandy Center, Fort Worth, TX 76102; \$39.95; Available in Radio Shack stores nationwide.)

— Robert Gray

Software

CoCo 1, 2 & 3

Cartoonamator — A Moving Experience

Patience isn't one of my numerous virtues — neither is programming graphics. The thought of typing in 1,373 DRAW statements appeals to me at about the same level that gum surgery does.

Cartoonamator, however, allows me to exercise my previously well-hidden talent for animation without the accompanying frustration. The creators obviously knew that human beings would be using it; one piece of practical advice in the excellent instructions reads: "If you mess up, just press BREAK and rerun the program. Your animation will not be lost, and your previous cell will remain unaffected." How about that?

The instructions complement the screen menus perfectly. Even people like me have a hard time making mistakes.

The basis for the whole operation is the "cell," a rectangular area in which you can put nine different colored blocks. By combining cells into a se-

quence of frames (which includes the capability to load more than one cell into a frame), you create animation. The results are a bit blocky, since you are using blocks, but so what? Let the Disney Studios take care of the involved stuff. You just have to realize that curves aren't really possible, so make designs that don't involve them.

Hint: Take notes on which cell is which — even though you can review them — so you don't get sudden changes you hadn't planned on. The same applies to the backgrounds, which you design separately. You combine the two in the frames.

You can also store favorite backgrounds and cells on the disk for later use in other animation projects. Obviously, you can store a complete animation sequence also — thus you could build part of it, store it, add some things later after a reload and keep building. The program advises you of how much memory you have remaining.

Operating under the theory that you just might make a mistake now and then, the program is loaded with prompts to help you escape before you insert something you'll regret later. When you put more than one cell in a frame, each one is displayed so you can check spacing. In addition, you can edit individual cells; once done, the changes you made automatically overlay that cell number wherever it shows up in the sequence.

It takes a while to use the joystick properly for cell placement. The instructions are clear enough; the reactions (mine) take a little more work.

The Display menu allows you to review the entire animation set you created step-by-step, in slow motion, or in regular motion or high speed. If you select high-speed, the program asks what type of CoCo you have, 1, 2 or 3.

Other than the animation you'll start producing within half an hour after making your backup copy, *Cartoonamator* is just fun to play around with. You can start with simple animation and work your way up to darkening skies and stellar explosions. A heck of a product for the price. Warning: It can be addictive.

(CoCoTronics Software, 51 Briarwood, Irvine, CA 92714, 714-651-0283; \$14.95 plus \$1.50 S/H)

— John M. Hebert

Domination — **Surround the World** **in 80 Plays**

HAWKSoft's *Domination* is a "Risk" board-type game that two to six players can play on the CuCo 3. The object of the game is to dominate the planet by using armies to defeat those of another player.

When the game starts, it randomly divides the world among the players. Then it goes through a series of rounds that allow the players to place their remaining armies, five at a time, on their countries. Each player must concentrate armies where they will provide the best offensive and defensive position. A lot of strategy is required with *Domination*, because you cannot randomly place your armies just anywhere.

When a player decides to attack another, he needs to take into account how many armies he can deploy for offense and how many the opponent can use for defense. At each turn a player may attack, move armies or pass to the next player. There is also the option of stopping the game and saving the board to continue later.



If a player decides to attack, he must pick which of his countries he will attack from, who to attack and how many armies to attack with. Then the defending player gets the chance to pick the number of armies he wishes to defend with. After the battle is decided, the defeated army is reduced. If the attacking army has defeated all the available armies of his opponent, he takes control of the country and transfers one of his armies to his new country. *The process of attack and*

defense goes on until one player has domination over the entire planet, or everyone decides to quit.

Domination is an entertaining game worth its price tag, but I have a "wish list" of features I think would make it even better. When playing with young players, I noticed they usually attack so often that everyone ends up with only one army per country. This means that no one can attack anyone because you must have at least two armies to attack (in case you win). The only thing anyone can do in this situation is pass. It would be nice if the program could detect this situation and force a "draft" to create more armies for the players. Also, it would be nice to be able to use the arrow keys as an option. While I have joystick, I usually must go dig for them.

Overall, I enjoyed *Domination* and was very happy to see an entertaining game below the \$20 barrier. I must warn people, though, that this is not a game you can play in a few minutes. I have been involved in games of Risk that have gone on for days.

(HAWKSoft, P.O. Box #7112, Elgin, IL 60121, 312-742-3084; S18)

— Dale Shell

Software

CoCo 1, 2 & 3

Big Pix 3 — Seeing the Big Picture

Have you ever wanted a graphics program that would fill an 8½-by-11 inch page? Well, *Big Pix 3* can both draw and print pictures up to 456 by 565 pixels — this is about six times the overall size of the normal PMODE 4 graphics screen.

Two joysticks and 64K are required to operate the program. The right joystick controls cursor movement. When you move the joystick, the cursor creeps across the screen, pixel by pixel. Holding down the firebutton makes the cursor move even faster. The left joystick controls the window or workspace. Even though one Hi-Res screen is displayed at a time, there is plenty of extra space left to the sides, top and bottom of the displayed screen.

Big Pix includes most of the standard

drawing commands, such as Circle, Box, Line, Draw, Erase, Paint, Ray and others. In addition, Get, Put and Invert are available for manipulation of pictures. Zoom provides a greatly magnified view of sections of the screen. Also, 10 different fonts are available for writing text to the screen.

In some ways, *Big Pix 3* is much like many of the drawing programs currently on the market, less the icons and pull-down menus. Its features are accessed by pressing one or more keys. One feature, *Move Cursor*, actually lets you enter the *x* and *y* coordinates manually for more precise cursor movement.

Files from other CoCo graphics programs such as *CoCo Max* and *Graphicom* can be loaded and edited. I tried several picture files from *CoCo Max II* and found that they loaded without problem. If you have *Graphicom Part 2*, you can use the *Big Pix* font editor to change *Graphicom 2* fonts into *Big Pix* fonts. This same font editor will also allow you to create and save custom fonts.

Program documentation is complete and well-written. Included on the program disk is a printable documentation file, just in case you misplace the original instructions.

On the down side, I found that using joysticks to manipulate the graphics gets to be somewhat tedious. Screen movement can be jerky in the Zoom function, because of the limits of the standard joystick ports. A routine to incorporate the Hi-Res joystick adapter would be a blessing.

The printer dump for both large and small picture sizes is set up for Radio Shack dot matrix printers only. Owners of other brands of printers need to provide their own printer dumps, and are limited to a standard 256-by-192 screen. I think the program should include provision for other popular printers, such as Epson and compatibles. It is a fact that a large number of CoCo owners have these brands of printers, and they will not be able to utilize one of the most useful features of the program.

Big Pix 3's strength lies in its graphics editing and full-page printing capabilities. For owners of Radio Shack DMP printers who want these features, this is an excellent product.

(Tolthian Software, Inc., Box 663, Rimersburg, PA 16248; \$24.95)

— Mark Haverstock

Computer Island Educational Software

BEYOND WORDS

32K Ext. - \$19.95 tape/\$24.95 disk
These Language Arts programs cover common misspellings, and synonyms/antonyms on each level. Additionally, Level 1 tests contractions and abbreviations, Level 2 tests homonyms, and Level 3 tests analogies. Each program has three parts and contains over 400 questions and uses over 800 words. All tests are grade appropriate. User modifiable (directions included). Printer option. Specify Level.

- Level 1 Grades 3-5
- Level 2 Grades 6-8
- Level 3 Grades 9-12



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- Level 1 Grades 3-5
- Level 2 Grades 6-8
- Level 3 Grades 9-12

CONTEXT CLUES - 4, 5, 6, 7

16K Ext. - \$17.95 tape/\$22.95 disk
Each reading program contains about 50 situational paragraphs with one key word missing. Child uses context clues to find correct answer in multiple choice format. Random selection of readings each round. Specify 4th, 5th, 6th, or 7th grade.

CONTEXT CLUES - 2-3

32K Ext. - \$19.95 tape/\$24.95 disk
A reading program wherein the child uses the context to choose the correct answer. Multiple choice format. Hi-res screen. Grades 2-3.

TRIGONOMETRY TUTOR

32K Ext. - \$19.95 tape/\$24.95 disk
A step by step tutorial for learning to compute the sides and angles of right triangles. All examples have graphic representation. Help commands and cursor aids assist throughout.

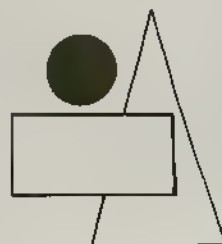


OPENING A BANK ACCOUNT

32K Ext. - \$24.95 disk only
A set of programs designed to introduce and provide practice in the skills of filling out bank applications, deposit and withdrawal slips, and computing bank account balances. Loaded with graphic presentations. Grades 3-6.

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AREA & PERIMETER

32K Ext. - \$19.95 tape/\$24.95 disk
Triangles, rectangles, and circles and covered in this Hi-res text and graphic program.

COCO WHEEL OF FORTUNE

32K Ext. - \$19.95 tape/\$24.95 disk
Hi-res graphics and screen in this version of the popular TV show. One to six players. Spin the wheel for points and guess a letter to solve the puzzle. Over 200 puzzles. Have fun while strengthening language arts skills.

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32K Ext. - \$17.95 tape/\$22.95 disk
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Stylograph — Power User's Word Processing Package

Our little Color Computer has grown a lot since its introduction as a 4K RAM machine, but many people still seem to think of it as a game machine. When serious work needs to be done, they think an MS-DOS machine is required to do the job.

Well, the Color Computer has some very powerful software available, and computer salespeople need to learn this fact. Take, for example, *Stylograph*, an

OS-9 Level II word processing system. I would put this program up against just about anything in the MS-DOS world that is within three times its price range. And this is for a game machine? Gimme a break!

Stylograph III uses the power of OS-9 Level II to advance our Color Computer even closer to the no-longer-better-but-more-expensive machines. The *Stylograph III* package comes with the *Stylograph* word processing system, the *Stylograph III* Mail Merge and the *Stylograph II* Spelling Checker. Included is a comprehensive manual with a three-lesson tutorial. As an upgrade from the OS-9 Level I version, *Stylograph* is very versatile — this flexibility means there are a lot of features to learn, so I highly recommend going through the tutorial at least once. After

you become familiar with *Stylo*, you can easily do just about anything you want.

There are a few small differences between the standard OS-9 version and the new version. The two I think most important are the different keystroke combinations used for the tab function and the escape sequence. I did not find a reference to the delete key, but I am sure it is in the manual somewhere. But these differences will give you very little heartache when compared to the power and versatility you will gain.

Just like earlier incarnations of *Stylo*, the new OS-9 Level II version can be configured to just about any hardware setup you can think of. It already has a large list of supported printers; if you do not find yours or a compatible listed, you can modify the drivers for your printer. This is not hard. The program takes you through a menu and asks questions about your printer; if you have your printer manual handy, you should not have a problem. In most cases you will find that your printer or one that is compatible will be listed.

You can also configure your terminal, but this feature will probably only be used by those people who use the remote terminal feature of OS-9. *Stylo* even supports hard drives. As I said earlier, you can configure *Stylo* just about any way you want.

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*"I think Stylograph
has taken the CoCo,
under OS-9 Level II,
another giant step
forward."*

Stylo uses three main modes. The Supervisor mode is well-named. It does not do much of the real work, but you go from there to the other menus where the real work is done. The Supervisor menu allows you to choose the options of editing, printing, saving, loading, appending, erasing or spooling a file to another file to be printed later.

The Insert mode is used to enter the text. This mode actually contains three modes: Insert, Overwrite and Programmers. The first two should be fairly clear by their names. The Programmers mode is new, but not to old users of *Stylo*. It can be invoked from either the

Insert or Overwrite mode and is similar to those two except that it adds a feature to aid people who do programming. Using the tab stops, the cursor will return to the last tab used after each return (sort of resetting the left margin temporarily). This helps if you indent a section of your file.

The third mode is the Escape mode, for cursor control. It allows you to move around the screen and to scroll the screen. It is also used for finding, replacing, moving, erasing or duplicating text strings. This is where block manipulations are done.

Stylo is also extremely comprehensive in its ability to format text. It includes all the things a printer can do to text, i.e., make it bold, enhanced, expanded, underlined, overlined, etc. But, for me, *Stylo*'s best feature is its dynamic formatting. As soon as you enter a format code, you see the effects on the screen. Centering, left and right justification and even underlining is shown right on the screen. Footers and headers are shown on each page along with the page breaks. These along with the status line let you know just where you are on a page — and you will know exactly how the output will look. The status line tells you the column, line and page number of the cursor.

Now, *Stylo* cannot duplicate all the special effects on the screen that your printer can on paper (like boldface and overlines), but a view command is available that shows all the words that have special effects on them, and the effects are coded so that you will know at a glance exactly what they are. *Stylo* even includes a math package to allow manipulating numbers in the text, both by row and by column. There are many other features too numerous to mention.

Stylo has finally brought all the features of a professional "big computer" word processor to the Color Computer. You will have to see it to fully appreciate all the features. But as always, I would like to see an addition. The current modes are displayed above the status line, all but for the Programmers mode; I would like to see this included. Also, *Stylo* comes with a template of the keyboard to illustrate the special keys. The template I received was for the CoCo 2, which has a keyboard layout different from that of the CoCo 3. The company is, however, working on a new template.

My final criticism concerns the spelling checker; it does not correct misspelled words for you. It will flag the

word, but you still have to look up the spelling yourself. When I misspell something, I want a program to tell me how to fix it, or at least make a suggestion. I have this complaint with most spell checkers. To be fair, I must add that while the spelling checker does not do all I would like it to, it does what it does do very fast.

Overall, I think *Stylograph* has taken the CoCo, under OS-9 Level II, another giant step forward. And while it works with 128K, it really needs 512K to soar like an eagle. I highly recommend *Stylograph* to anyone who does serious word processing or wants to take advantage of all the features the CoCo 3 has to offer. Now, if we could just convince "some people" to take the Color Computer seriously, showing them it is not a game machine but the

most powerful eight-bit computer money can buy, well, we could really fly.

(Stylo Software, Inc., P.O. Box 916, Idaho Falls, ID 83402, 208-529-3210; \$199.95)

— Dale Shell

Software

CoCo 1, 2 & 3

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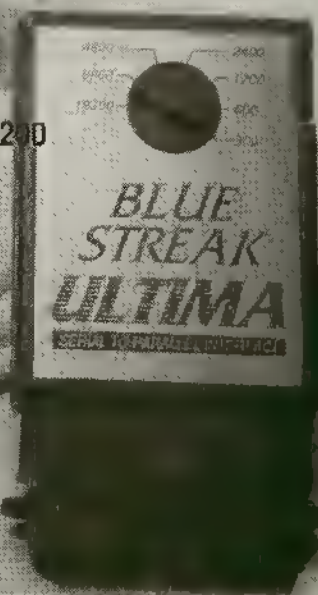
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one of those people who, like me, just can't seem to get around to writing letters, no matter how good you feel when you actually drop that envelope into the mailbox? If so, *EZWriter*, available on tape or disk from E.Z. Friendly Software, may be of interest to you.

EZWriter enables you to compose a short (one page maximum) letter, save it to disk or tape and print out one or more copies, without the struggle of learning a full-featured word processor. It also provides the capability of storing a mailing list, which can be used to print mailing labels.

A separate copy of your letter can be printed for each person on the mailing list, complete with personalized address and salutation on each. This is an extremely nice feature and would have immediate value to small businessmen, club secretaries, and people who send out those "state of the household" letters in their Christmas cards! Once a letter or mailing list is stored, it can be retrieved and updated as necessary.

EZWriter is intended to be simple to use and attractive to people who do not care to invest the necessary hours to learn word processing. In that intent it succeeds admirably. I was able to begin typing a letter within minutes of opening the package, with only the barest glance at the documentation, which is clear and readable. The screen displays are largely self-evident, and there are no confusing inconsistencies. If you find word processing intimidating, you'll love *EZWriter*!

On the other side of the commentary, however, the program is written entirely in BASIC, and is therefore quite slow. I am not a great typist, but *EZWriter* was consistently unable to keep up with me. Another irritant involves mailing labels. There is no provision for checking alignment of the label paper before printing commences, nor can you suspend printing in the case of a printer jam.

Some of my complaints about this package are a matter of design trade-offs: Should the program be easy, or more flexible? In each case, the author went for ease of use. The text you enter can only be edited by replacing individual lines with new ones, and the new lines must be very nearly the same length as the old ones. You have no choice as to the wording of the salutation ("Dear") or the closing ("Sincerely"), nor do you have control over such things as page size, line length, margins, etc. The author's stated goal is

one of relieving the user of having to deal with technical clutter.

I found one error in the program. Prior to printing a letter, it asks if you want to change the printer baud rate. If you do, and respond with 2400, as in my case, the program does *not* reset the baud rate. Instead it returns to "Do you want to change the baud rate?" It continues to ask this until you respond with Y and give it a value other than 2400.

You can fix this error by replacing lines 765 and 766 with a line in which you simply do a POKE (150, xx), where xx is the appropriate value for your baud rate. If you don't care to mess with the program, you should set your baud rate before running the program, then answer N when asked if you want to reset it.

EZWriter is a great program for someone who wants the minimum necessary to write and print a single-page letter.

(E.Z. Friendly Software, Hutton & Orchard Streets, Rhinecliff, NY 12574, 914-876-3935; \$19.95 plus \$1.50 S/H)

— Jim K. Issel

Book

Computer Dictionary — From A Bus to Zone, Plus

Shortly after I joined the editorial staff of RAINBOW, I was given the task of compiling an in-house dictionary/stylebook to help the editors deal consistently with "Computerese." I prepared a formidable list of the terms, abbreviations and acronyms we regularly encounter, then began to search for standard spellings and definitions. The effort was only partly successful, however, because I soon discovered that computer vocabulary is a vast conglomeration of specialized terminologies and a sort of high-tech patois that seems to change, along with the technology, by the nanosecond.

Fortunately, I was relieved of my duties as company lexicographer when we acquired the fourth edition of Charles Sippl's *Computer Dictionary*, which has become an indispensable

resource for all of us here at THE RAINBOW. Although we use it professionally in a variety of situations (from verifying spelling to clarifying terms and concepts), this would be a valuable reference book for anyone who spends any time at all around computers. It is easy to use and covers an impressive number of subjects in a thorough, straightforward way.

As in a normal dictionary, the entries in *Computer Dictionary* are alphabetized (abbreviations are alphabetized right along with the words rather than grouped together at the beginning), and the first and last entry on each page appear as headings to let you know what you will find on that page. There are also numerous cross-references to simplify your search for items that could have more than one location — for example, the entry "primitives" says "See graphics primitives." This is an important timesaver, because there are so many computer terms that mean essentially the same thing but are referred to in different ways.

Since this is a dictionary, the information you need is quickly accessible and presented in manageable proportions — but it is by no means limited to minimal definitions. *Computer Dictionary* is billed as a "browsing dictionary"; the entries contain enough detail, description, historical background, and even diagrams and photographs to provide a clear explanation of each subject.

Computer Dictionary contains more than 12,000 entries dealing with micro-, mini- and mainframe computer technology. The entries range from elementary (bit, disk, garbage) to esoteric (econometrics, silicon compilation, zatacode indexing) and cover a wide selection of computer-related topics.

The publishers are apparently committed to keeping this book as current as possible, too, revising it as the computer industry grows and changes. This edition has been updated and contains over 1,000 new entries, with an emphasis on robotics, artificial intelligence and factory automation. In his preface, the author suggests 20 areas of technological advancement that may bear watching in the future. They include developments in such areas as office automation, operating systems, voice recognition and synthesis, and computer-controlled video systems — developments that will presumably be included in future editions of *Computer Dictionary*. Such concern with the

evolution of computer technology is a measure of the reliability and usefulness of this book.

These days, the volume and complexity of computer-related subjects can be intimidating and confusing. But, to borrow from an old adage, you don't need to know everything, as long as you know where to look it up. And that's easy — just reach for your *Computer Dictionary*.

(Howard W. Sams & Co., Inc., 4300 West 62nd St., Indianapolis, IN 46268, 800-428-3602; \$24.95)

— Jody Gilbert

Software

CoCo 3

System5 — CoCo 3 Graphics Package

System5 is a Hi-Res graphics generator written for your 512K CoCo 3, requiring at least one disk drive, a monitor and Radio Shack's Hi-Res Interface (Cat. No. #26-3028).

You can use the program with a joystick or touch pad, but a mouse is recommended. The disk is not copy-protected, so you can make a backup copy for safekeeping. Although I did not try the program on a color composite monitor, the 20-page instruction booklet explains how to merge a composite routine available on the disk.

The program hoots with a simple RUN "SYSTEM5", but loading takes about 30 seconds. The main program is written in machine language — once it's loaded, the program is fast and smooth.

The main menu presents 20 icons ready for action. You use your mouse or joystick to point to the desired icon, and then press the button to select it.

The drawing icons include Box, Circle, Line and Freehand. You can make any size rectangle or circle you want. Line lets you draw lines using the "rubber band" method, while Freehand allows you to draw at will. There are five cursor sizes in cursor control mode, comparable to the range from a finetipped pen to a piece of chalk.

You can choose foreground and background colors and fill in your drawings by choosing the Paint icon, and with Text you can add words to your artwork. Spray Paint is a little like

doing graffiti — you actually "spray" color on the screen. Another interesting effect is Radi, which makes four mirror-image freehand patterns on the x and y axes. You have to see this function to appreciate it.

Editing icons include Palette, Big Pixels, Copy, Erase, Block Erase and Clear. Palette lets you use all of CoCo 3's 64 available colors in your pictures. The settings are saved and loaded with your pictures automatically. Big Pixels enlarges an area of the screen for precise editing; this helps you achieve detail. With Copy you can duplicate an entire image or part of an image on another part of the screen. Erase and Block Erase let you wipe away a little or a lot of your work. If you're really unhappy with your drawing, you can use Clear to wipe the whole screen and start again.

The other icon options are Print, Load, Save and Exit, which are self-explanatory. The programmer blessed the Exit function with an "Are you sure?" feature, which might save a careless CoCoist hours of work.

At any time during your drawing exercises you can press the F1 key. This results in a drop-down menu that has the options of Undo, All Undo, Insure and Redraw. Undo lets you erase or delete your last activity. If you don't like the size of the last square you drew, just Undo it. You can even erase a series of activities.



Insure/Redraw is a novel feature. With these two commands you can save an image temporarily in memory and then recall it. This is useful if you are not quite satisfied with your work and keep modifying it only to realize later that you should have left it alone in the first place! When you have reached a turning point in your drawing and are unsure about how to proceed, select Insure and try out some different ways. If you don't like the changes, just select Redraw and your original picture will appear. Although you can do the same

Reviewer Information

In order to continue to bring Tandy Color Computer users all the best information about new hardware and software products each month, we are expanding our independent review staff. Therefore, we invite you to join THE RAINBOW's elite fleet of reviewers.

You read THE RAINBOW because you love your Tandy Color Computer, so if you want a creative outlet and a chance to examine quality hardware and software, with your observations published nationwide, we want to hear from you.

Send us a cover letter with your name, address, occupation, list of equipment, areas of general interests, and a sample review of a CoCo product you are currently using. We look forward to your response. After all, we already see you have the best taste in computers.

Reply to:

Reviews Editor
THE RAINBOW
The Falsoft Building
P.O. Box 385
Prospect, KY 40059

thing with disk saves, this approach is faster and provides easier editing.

The author states in the manual that *System5* was not intended to print out pictures, but he has included two print routines in the program for the DMP-105, DMP-106 and DMP-130 printers. I have a Star printer, so I was unable to try the print function.

System5 supports up to four disk drives, and I can see why. Each picture takes up 14 granules on the disk! The picture files are saved with a .PIC extension. A demo picture is included on the system disk.

I am impressed with *System5*. My first thought upon opening the package was that it was just another graphics package, but it is really fun and very easy to use. The command icons are simple and straightforward. I was unable to detect any serious flaws in the program, and it performed as advertised. Although it does not offer some of the more advanced options available from the big guys, this neat package is well worth your consideration.

(Sun Products, 5455 Hansel Ave., Building 1, Suite 7, Edgewood, FL 32809, 804-451-1255; \$12.95: First prodnet review for this company appearing in THE RAINBOW.)

— Jerry Semones

Software

CoCo 1, 2 & 3

Hyper-I/O — Configure Your Drive System

If you have been considering a 3½-inch drive or hard drive for your CoCo, *Hyper-I/O* from Burke & Burke may be what you are looking for, especially if you don't want to move to OS-9. *Hyper-I/O* is a dynamic disk interface that allows you to use almost any type of floppy or hard disk drive in any combination on a CoCo 1, 2 or 3. It can also coexist on a hard drive with OS-9 if you change your mind and want to use OS-9 at a later time.

Hyper-I/O comes on an unprotected disk and has an 80-page manual that fully explains all of the many functions. Other features include full user-

configurability, the ability to put *Hyper-I/O* on EPROM, enhanced BASIC commands for access to new features, and the ability to read standard disks in quad-density drives.

The program is compatible with the Burke & Burke CoCo XT and CoCo XT-RTC hard disk (reviewed April 1988, Page 137) and competitive hard disk systems. It has full reset protection for RAM-based systems and an optional RAM disk and print spooler for the CoCo 3 called *Hyper-III*.

There are several different programs on the disk, including some OS-9 utilities. The disk is divided into RS-DOS and OS-9 areas, so a FREE statement will indicate that the disk is full even though it does not appear to be when counting the number of granules used. HDIR displays a directory of a *Hyper-I/O* MSA under OS-9. HDEL will delete a file from a *Hyper-I/O* MSA. HCOPY will copy a file between OS-9 and *Hyper-I/O*. PATCH is an assembly language utility used to overlay a memory-resident module. CSM is an overlaid version of the OS-9 Level 1 assembler ASM, which has been modified to generate RS-DOS compatible output. Finally, in the DEFS directory there is a set of 11 equate files that, when used with CSM and HCOPY, can be used to write *Hyper-I/O* device drivers under OS-9.

In order to use *Hyper-I/O* it is necessary to learn a few new terms. MSA (mass storage area) and disk handles are two new terms with which you will need to become very familiar. Mass storage areas come in two types, "flat" and "RBF" MSAs. A flat MSA is allowed to take up all the space on a storage device (a floppy drive) while an RBF MSA is allowed only a portion of a device (a hard drive). It is the RBF MSAs that are compatible with OS-9. MSAs can be as large as 3 Mb or as small as 2K. This way you can organize your hard drive in any way you want, having RS-DOS and OS-9. Disk handles are the four drive handles for all of the MSAs.

While you can define hundreds of MSAs, you can have only four handles at any time. This allows you to use a single drive in many ways. For instance, you can set up two double-sided 40-track drives as two large drives or four small drives. *Hyper-I/O* gives you new commands that allow you to change this setup on the fly.

Hyper-I/O upgrades Disk Extended Color BASIC to provide new features and commands. It changes all functions and commands using drive numbers to

use disk handles instead, but uses existing error messages for new commands and features. The manual fully explains the new commands and related error messages.

The BACKUP command copies one MSA to another, but the MSAs must be of the same size. To copy programs from one type of MSA to another, use COPY. *Hyper-I/O* adds a feature to COPY that allows you to specify a destination disk handle without typing the filename a second time. The output of DIR was changed slightly to show the disk handle for flat MSAs and the volume label for RBF MSAs.

New commands in *Hyper-I/O* include OPEN DRIVE, which has four forms of use, and UNLOAD, which closes all files on the MSA specified by the disk handle and then calls the MSA's device driver PARK function. The PARK function puts your storage device into a state that allows the device to be safely transported — a must for hard drive systems.

I tested this program on two Teac slim-line DS/DD drives and could not find any problems with standard BASIC programs. All binary programs so far have returned me to standard RS-DOS after running, which I expected; you would need to put *Hyper-I/O* on an EPROM to prevent this. I have not had any programs crash as a result of *Hyper-I/O* being in the system.

I enlisted the aid of Dick White to test the program on his 3½-inch drive and his new hard drive using the Burke & Burke CoCo XT interface. He had already set up his hard drive for OS-9 but did try to set up four RBF (OS-9 term for any disk drive) MSAs on the 3½-inch drive. He discovered a bug that would not allow this and sent a message on Delphi to Chris Burke. The bug was very quickly corrected, and both Dick and I had the corrected copy in a few days. Chris is very helpful and supports his products.

If you find yourself considering some of the larger drives that are now becoming available at lower costs, *Hyper-I/O* will put all that new space to work for you, especially if you want to use it (or even part of it) with RS-DOS.

(Burke & Burke, P.O. Box 1283, Palatine, IL 60078, 312-397-2898; \$29.95; *Hyper-III*, \$19.95)

— Barry Pottinger

Mr. Corey — Save the World from Nuclear Destruction

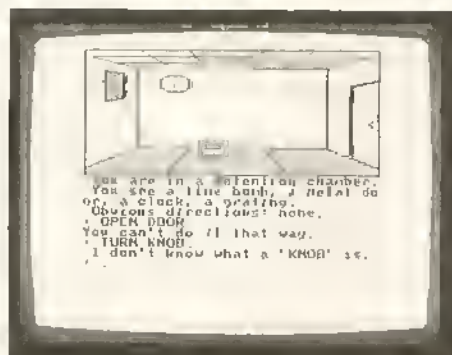
Mr. Corey, an Adventure from Valkyrie Software, takes place on an uncharted island where secret nuclear experiments are being conducted. As a secret agent for ATHENA, you have been discovered and placed in a security cell with a ticking time bomb. Your job is to escape your captors in time to warn the world of the evil deeds planned by the villainous Mr. Corey.

Mr. Corey is similar to another Valkyrie program, *Tomb of T'ien* (reviewed in the May '88 RAINBOW, Page 129), in terms of overall style. Colorful graphics are used along with text to provide a split-screen type of display. The top half shows your surroundings, and the bottom half is used to type in commands.

Mr. Corey needs at least 64K of RAM and Extended Color BASIC. It will run fine on the CoCo 3, but if you are using the Tandy CM-8 RGB monitor, be prepared to see the graphics in

black and white. If you connect your CoCo 3 to either a composite color monitor or a color TV, you will see the program in full color.

The software, available on tape or disk, is copy-protected, but a free replacement will be sent if you develop problems during the first year. A non-executable backup can also be made that will allow you to repair the original if a problem develops.



Mr. Corey is a fascinating Adventure that kept me busy for hours. The program uses the familiar direction commands such as N or North, etc. You can Get, Put, Drop, Open, Go and Look. As usual, you can also keep track of the items that you are carrying with the Inventory command. These are just a small sampling of the straightforward commands involved.

You will have to use all of your wits to solve this one. Never give up when commands don't seem to work. I found in one particular case, a violent act such as 'Kick'ing was needed. A game save command is also available to allow you to quit without having to start all over again the next time you play. The program is in two parts: The first tests your ability to escape the security cell; and the second, which automatically loads, will keep you busy for hours, and in my case — days!

Mr. Corey is a good Adventure. The graphics are fair, but their lack of detail compared to other Adventures on the market does not deter from the appeal of the program. I admire the author, Scott Settembre, for his unconventional style and technique. Valkyrie has done a nice job in providing interesting, challenging and fun Adventure programs to the CoCo Community, and this one is deserving of a spot on your computer table. But, really, does a name like "Mr. Corey" sound villainous to you? It sounds more like a high school science instructor to me.

(Valkyrie Software, P.O. Box 2120, Monroe, NY 10950, 914-783-0191; \$19.95 plus \$2 S/H)

— David Gerald

One-Liner Contest Winner . . .

This short utility converts the screen location of a PRINT@ statement to the coordinates of a SET statement, or vice versa.

The listing:

```
1 INPUT"PRINT@ OR SET";A$:IF A$="
P"THENCLS:INPUT"PRINT@";P:K=P/32
:V=INT(K)*2:H=(K-V/2)*64:PRINT"S
ET(";H;"",V;"",C)":SET(H,V,3):GO
TO1:ELSECLS:INPUT"SET(H,V)";H,V:
M=(H/64):K=INT(V/2)+M:P=INT(K*32
):PRINT"PRINT@";P:PRINT@P,CHR$(1
82):GOTO1
```

Don Rowan
Minneapolis, MN

(For this winning one-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape*.)

One-Liner Contest Winner . . .

If you (or your child) need to brush up on your multiplication tables from 1 to 12, this one-liner is the one to have.

The listing:

```
10 CLS8:FORD=2TO12:CLS8:PRINT"
MULTIPLICATION TABLE FOR";D:PRIN
T"=====
":FOR K=1TO12:PRINTTAB(10)D;"X";
K;"=";D*K:NEXTK:PRINT" PRESS SHI
FT & @ TO PAUSE.":FORX=1TO1000:N
EXT:NEXTD:CLS3:INPUT"ANOTHER? Y
OR N";Z$:IF Z$="Y"THEN10
```

Joe F. Sobieski
Johnstown, PA

(For this winning one-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape*.)



The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, your assurance that we have seen the product and have ascertained that it is what it purports to be.

◆ **AL-WRITE**, an assembly language program development system for the CoCo 3 that lets the programmer write and assemble programs using a full-screen editor and a menu-driven environment. *C-Ware Laboratory, P.O. Box 4967, San Antonio, TX 78285, (512) 690-1788; \$30.*

◆ **BASIC Utility Diskette**, a collection of utilities for BASIC programmers that includes the ability to perform line-by-line comparison of two programs, prepare a cross-reference of line numbers, read data from text memory and print it out, and print to a CoCo disk file in blocks. *T.E.M. of California, Box 4311, Fullerton, CA 92634, (714) 871-8210; \$19.95.*

◆ **The Color Job Diary**, a BASIC program that keeps track of customer accounts for any type of business. There is no limit to the number of files the program can accommodate. Epson-compatible printers are supported and a mouse is required. *Color Alloy CoCo 3 Products, 1124 Denney Drive, Duluth, MN 55805, (218) 724-3663; \$20 plus \$3 S/H.*

◆ **DIR Cataloger V. 1.5**, a utility that reads a disk directory and disassembles it into several sections: filename, extension, file type, etc. Directory information can be sent to the screen, printer or disk file. Requires a CoCo 2 with 32K memory or a CoCo 3. *Mouse Software Ltd., 7013 Summit Ave., Cincinnati, OH 45243, (513) 984-4089; \$20.*

◆ **Disk Manager Tree**, a utility that allows file manipulation on OS-9 disks, whether RAM disk, hard drive or floppy. It uses a "tree" display to show relationships of directories and subdirectories. OS-9 Level II, at least one disk drive and a CoCo 3 with 512K required. *Alpha Software Technologies, 2810 Buffon St., Chalmette, LA 70043, (504) 279-1653; \$29.95.*

◆ **The Entertainer**, a collection of 12 programs for entertainment, consisting of puzzles, brain games and games of chance. Included is a two-player strategy game. For the CoCo 1, 2 and 3. *George Aftamonow, 46 Howe St., Milford, CT 06460, (203) 878-3602; \$10.*

◆ **GCS File Transfer V. 1.4**, a group of OS-9 programs that transfer files on MS-DOS and FLEX-format floppies to and from the CoCo, CoCo 3 and OS-9 Level II required. *Granite Computer, Route 2, Box 445, Hillsboro, NH 03244, (603) 464-3850; \$44.95.*

◆ **Graphics-25**, a 100-percent machine language graphics utilities program that allows you to use the full memory range of the 512K CoCo 3 to create up to 25 HSCREEN 1 and 3 screens, or up to 13 HSCREEN 2 and 4 screens. It also allows instant changes of all 16 palettes and adds new graphics commands to BASIC. *Gimmesoft, P.O. Box 421, Perry Hall, MD 21128, (301) 256-7558; \$24.95.*

◆ **KJV CoCo Disk No. 14**, the Bible's Book of Matthew on disk in ASCII format. Requires a CoCo 1, 2 or 3 with 32K and at least one disk drive. Also requires a word processor. *BDS Software, P.O. Box 485 P, Glenview, IL 60025, (312) 998-1656; \$3.*

◆ **Memo Calendar**, a program that will display a calendar on your monitor for any month from 1984 to 1999. Memos and reminders can be grouped in files. For the CoCo 1, 2 and 3. A disk drive is required; a printer is optional. *Sunrise Software, 8901 NW 26 St., Sunrise, FL 33322; \$19.95 plus \$2 S/H.*

◆ **MPI Locking Plate**, two styles of boards that firmly attach a Multi-Pak Interface to the CoCo, preventing costly damage that could result from jostling. *Gimmesoft, P.O. Box 421, Perry Hall, MD 21128, (301) 256-7558; \$9.95.*

◆ **OS-9 Level II BBS**, a set of commands and utilities you can use to create an OS-9 BBS program. For the CoCo 3 with OS-9 Level II. *Alpha Software Technologies, 2810 Buffon St., Chalmette, LA 70043, (504) 279-1653; \$19.95.*

◆ **V-Term Terminal Emulator**, a multi-tasking terminal emulation program for the CoCo 3 that emulates VT100 and VT52 terminals and supports CoCo 3 memory. Support for multiple files in memory is included to remove the need to constantly save capture buffers and Xmodem downloads to disk. *Gimmesoft, P.O. Box 421, Perry Hall, MD 21128, (301) 256-7558; \$39.95.*

◆ **First product received from this company**

The Seal of Certification program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a Seal, the magazine certifies the product does exist — that we have examined it and have a sample copy — but this does not constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

— Lauren Willoughby

The Seventh Year Of Rainbow

An index to the articles, programs, reviews and authors appearing in THE RAINBOW from July 1987 through June 1988.

Compiled and Edited
by Leslie A. Foster

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TOTAL NUMBER OF ARTICLES (July 1981 to June 1988) — 4129

This is the fifth index to the Rainbow.

Previous indexes to the Rainbow are available as follows:

July 1981 to June 1984—July 1984 issue
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In this and in future "CoCo Consultations," I will be trying something new. In addition to the familiar Q & A column, I will also include tidbits of information contributed by various folks and, in some cases, comment on the information. Thus, even if you don't have a question, I invite you to send in any little hints or descriptions of experiences you have had with the CoCo that you think might be of interest to the CoCo-owning public in general.

CoCo Economy

Can a Color Computer 2 be upgraded to a Color Computer 3 without actually buying a Color Computer 3?

Rio Yates
Corpus Christi, TX

While in theory you can do the upgrade you ask about, it would take a skilled hardware technician about 24 to 48 hours of labor to do it (such technicians make \$30 to \$60 an hour), and cost you about \$100 in parts. So the answer to your question is no. The only way to go from a Color Computer 2 to a Color Computer 3 is to buy a Color Computer 3. There are just too many differences between the two for an upgrade of one to the other to be practical.

Versatile Multipack

We just got a CoCo 3 and upgraded our multipack interface as you suggested. Will we have any trouble using that multipack with our CoCo 2 on occasion? We read your January 1987 article in RAINBOW and do not have any

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and on-line commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

C O C O



CONSULTATIONS

By Marty Goodman
Rainbow Contributing Editor

of the "problem" third-party hardware cards you mentioned.

Mr. and Mrs. Greg Adams
Rock Falls, IL

If you are not using any of the "problem" hardware cards (PBI Word Pak model I or II, CoCo Max 1 or 2 Hi-Res pack, etc.), then your multipack upgraded for the CoCo 3 should continue to work fine on your old CoCo 2.

On Track with ADOS-3

Could you explain how to use a 40-track, double-sided drive as a 40-track, double-sided drive under Disk BASIC? Currently I am using it as a 35-track, single-sided drive.

Linda Meanx
Lafayette, LA

The best way I know of to use Disk BASIC with 40-track, double-sided drives is to buy ADOS-3 from Spectro-Systems, then later burn it into a Disk EPROM. ADOS-3 also fixes some bugs and adds a great many extra features to Disk BASIC, while maintaining compatibility with programs written for unmodified Disk BASIC. To get the full benefit of ADOS-3 you need to burn it into an EPROM after configuring it. This is offered as a service at a modest price above the cost of the program itself.

Upgrading Multi-Pak

What is involved in upgrading both the new and the old Multi-Pak to work with the CoCo 3? Do I really have to upgrade a Multi-Pak even if it seems to work right with my CoCo 3? Will the upgraded Multi-Pak work with the CoCo 1 and 2 after the upgrade?

Christian Michand
(SUPERCHRIS)
Montreal, Quebec

In the January 1987 issue of RAINBOW I wrote an article on this subject; although what I wrote then is correct as far as I know, I now have even more information. If you own an older (bigger gray or white) Multi-Pak (Cat. No. 26-3024) the upgrade procedure is quite simple: Replace the old PAL chip (the only socketed chip on the board, so it is easy to find) with Part # AXX 7123 from Tandy National Parts. That is all.

For the new, smaller white Multi-Pak (Cat. No. 26-3124), the upgrade procedure is far more complex, as it involves installing a satellite board in the Multi-Pak. While the board is available, it is not accompanied by instructions; the installation is a bit tricky, so I recommend having Tandy upgrade it. Alternatively, owners may refer to Delphi, where we have in the "Hardware Hacking" database a copy of the schematic for that satellite board that will allow a competent hacker to upgrade his own 26-3124 Multi-Pak for under \$2 in parts.

In the light of newer information, I strongly recommend that *all* existing Multi-Paks be upgraded if they are intended to be used on the CoCo 3. Note that none of the Multi-Paks currently being sold are CoCo 3-compatible at the time of purchase. Due to an apparent order miscalculation for Multi-Paks, Tandy has at least a two-year supply of the old CoCo 2 Multi-Pak and is reluctant to tool up to make a CoCo 3 version. So CoCo 2 Multi-Paks continue to be sold, requiring purchasers of CoCo 3s to have the upgrade done. It is also essential to note that even if your CoCo 3 *appears* to work just fine with your Multi-Pak, the upgrade is required. The upgrade may prevent slow, subtle damage to your CoCo 3; it is also necessary for some current CoCo 3 accessories (such as the new Disto No-Halt Controller).

A Multi-Pak upgraded in this fashion will still work fine on a CoCo 2, provided you do not use a Word Pak model 1 or 2, CoCo Max 2 Hi-Res Pak, or other third-party hardware addressed above \$FF7E. The upgraded Multi-Pak will continue to work with CoCo 2 or CoCo 3 and a disk controller, an RS-232 pack, Orchestra 90, the Tandy Speech/Sound Pak, most Speech Systems packs, and the Word Pak RS.

Common Hardware Failures

What are the most commonly reported causes of hardware failure in the CoCo 3?

*Dave Archer
(DAVEARCHER)
Finley, ND*

Surveying reports from the Delphi CoCo SIG, from my own experience repairing a few, and from several friends of mine who work for Tandy computer repair centers, it seems the most common cause of catastrophic Color Computer 3 failure is a blown 68B09 chip. Because this chip is soldered directly to the board, it takes a skilled technician to replace it.

Poorly seated GIME chips account for a lot of video problems and "flaky" machines. The cure there is to carefully remove the GIME chip, look for bent pins in the socket, straighten any you may find, wash both GIME chip pins and socket with ethanol, then very carefully and accurately reinsert the GIME chip in its socket. Observe at all times standard precautions for handling CMOS chips.

I've also encountered quite a few reports of "keyboard failure" caused by a dead or damaged keyboard PIA chip. In the CoCo 3 this is IC5, called LSC81001. It is an open collector 2 Mhz variant of the familiar 6821 PIA chip, but it must be replaced by the exactly correct part that can be obtained from Tandy National Parts. This 40-pin chip is also soldered directly to the board. Much to my surprise, there are relatively few reports of machine failures due to a dead GIME chip. That is fortunate, for Tandy still wants roughly \$50 for the part, which can be obtained nowhere else.

An Optional Monitor

The new version of the Commodore 1084 monitor (designed to support all

Commodore computers, including the C64, C128, and Amiga line) has a six-pin DIN jack that accepts an RGB analog signal with separate upgoing horizontal and vertical sync pulses. I used a cable exactly like your Magnavox 8CM515 cable to hook a CoCo 3 to it, and the results were excellent. I purchased this monitor from a local Service Merchandise store for \$340. The rated dot pitch on it is .42, exactly the same as that for the Magnavox 8CM515 monitor.

*Jim Smith
(JWSMITH)
Miramar, FL*

Magnavox has been making monitors for Commodore for a long time. The old 1902 monitor for the C64 and C128 was a modified 8CM562. It seems like this new 1080 monitor is a slightly customized 8CM515 model, for the overall appearance and layout of both the front and back of it (judging from the pictures in the user manual that you kindly sent me) are suspiciously similar to that of the 8CM515. I am delighted that you informed me of this added option that CoCo 3 owners have for acquiring an RGB analog/composite color monitor. This monitor also has "chrominance/luminance"-type inputs, a color video protocol used only by the newer Commodore 64s and Commodore 128s among home computers. It is also being used in the newly introduced ultra high resolution VHS VCR systems. Frankly, few folks really need it. Note, too, that RAINBOW advertisers like Howard Medical sell the Magnavox 8CM515 and CoCo 3 cable for roughly the same price (including shipping) as you paid for your Commodore 1084.

Reversing the Color Set

On the CoCo 3, how can I use those old CoCo 2 programs that ask you to press the reset button if the color set (red and blue) is reversed?

*Richard S. Schultz
Carmichael, CA*

As you no doubt discovered, pressing reset on a CoCo 3 will not cause the color set to reverse. There is an easy solution, however. If, after a normal power-up and booting of the program, you end up with the wrong color set, merely turn the machine off (or press the reset button while holding down

CTRL and ALT). Then, power machine again (or press the reset button a second time, this time holding down the Ft key. This will result in an odd black-on-blue normal BASIC screen, but don't worry about that. Merely load and execute the program, and you will find it now has the color set you want.

An EPROM for the Tandy FD-502

What sort of EPROM is needed if one wants to burn a modified DOS ROM for the controller that comes with a Tandy FD-502 model drive?

*Leslie Earl
(LESTERE)
Houston, TX*

This latest model of CoCo disk drive system from Tandy, the double-sided FD-502, is accompanied by a new controller that now uses a 28-pin ROM instead of the old 24-pin ROM. This ROM should be pretty much pin-for-pin compatible with 2764-type EPROMs. I recommend using 250 ns or faster versions of the 2764, although slower ones will also work fine in most cases. If for some reason you have a problem substituting a 2764 EPROM for Tandy's 28-pin ROM, try running jumper wires from Pin 28 of the EPROM to both pins 1 and 27 of the EPROM (with all pins still inserted in the socket). Sometimes when an "EPROM-compatible" ROM is used, some lines specific to the EPROM (like Vpp) that need to be pulled to +5 volts when the EPROM is in use, are left unconnected for the ROM chip. It is a good thing Tandy is switching to 28-pin ROMs at long last, for I hear that Motorola will be discontinuing production of the 24-pin 68766 before the end of 1988.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P.O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form which has complete instructions.

Five years ago I introduced to the CoCo Community a piece of hardware called the Disto controller. It is compatible with Radio Shack's controller, as well as others. One of its interesting features is an internal mini expansion bus (MEB). This bus allows internal expansion of a peripheral card. Two of the adapters available for this controller are more popular than ever these days. The first is the clock/parallel adapter. This allows the user under OS-9 to have the real time at hand without having to type it in every time and to be able to connect a parallel printer to the CoCo without having to use an adapter. The second is a hard disk/serial adapter, which allows the user to connect a hard disk to the CoCo. It also has an RS-232 interface that is somewhat compatible with the Radio Shack Deluxe RS-232 Pak.

Until now, only one of these adapters would fit into the controller at one time. If you wanted a second, you needed an MEB carrier or a RAM disk along with a Multi-Pak Interface. Very expensive! If you had a CoCo 3, you also had to have the Multi-Pak modified. More bucks. As for myself, I have two systems, a CoCo 1 with an unmodified Multi-Pak and monochrome monitor, and a CoCo 3 with no Multi-Pak and a Sony RGB monitor. I don't intend to buy another Multi-Pak for my CoCo 3 system, so where does that leave me?

There were a couple of reasons for writing this article. The first is that if I do something for myself and find that it helps me do something else better, faster or more easily, I think that other people must have the same needs; most of the time I am right. This is why I began writing articles in the first place. The second reason is that Radio Shack has discontinued the RS-232 Pak and may discontinue the Multi-Pak in the future. What will we do?

If you take a look at the two adapters described above, they represent a lot of I/O: serial, parallel, hard disk and clock. To be able to have all those things without the Multi-Pak would be great. Getting the Super Controller or the Super Controller II is a good start, but you can still only put one of the two adapters inside the controller. This is

*A project to fit two
adapters into your
controller —
at the same time*

Two for One

By Tony DiStefano
Rainbow Contributing Editor

where I come in. I decided that I wanted both of these adapters in my second system's controller. So I took out my soldering iron, and this is what I came up with.

Before you get started, let me give you the drawbacks to this project. First of all, when all is said and done, you can no longer close the cover of the controller. An even bigger problem is power: When both of these boards are plugged in, the current draw is a little over the recommended limit of 300mA. A separate regulated supply must be built to handle the extra demand on power. Apart from these hurdles, a little soldering experience is needed.

Let's review some theory before taking out the ol' soldering iron, however. The MEB is a 17-pin connector that has data, address and control lines. The following is a description of these pins:

Pin #	Description
1	Reset
2	E Clock
3	A0
4	A1
5	D0
6	D1
7	D2
8	D3
9	D4
10	D5
11	D6
12	D7
13	CE (Chip Enable)
14	GND
15	R/W
16	+5V
17	A2

Study the pins carefully; it is a standard memory-mapped area. If we added another area to this, the only thing to change would be the CE. All other lines — data, address and control — would be the same. A piggyback technique here will do fine, except for the CE pin, which will go to another memory-mapped area. This is not too hard since the controller is already decoded; all you have to do is fish out the CE. Later, I'll tell you how to patch the OS-9 software, as well.

Not much to the theory, is there? In fact, this project is more mechanical than anything else. Now, it is time to get started. Please don't do any of these modifications with the power on. All the modifications are done on the hard disk/serial adapter. There are two cuts to do on this board, or only one if you have a modified power supply and it can stand the extra drain.

The first cut is to disable the CE from the board. Look at the component side of the board. Locate Pin 13 on the MEB connector. Follow the trace to the first hole and cut the trace just before that hole. For the +5V, locate Pin 16 on the same connector. Follow its wide trace to the first hole about one inch away, and cut the trace just before you reach that hole.

On the solder side, solder a set of 17 short male single inline header pins to the bottom of the MEB connector. The clock/parallel adapter board will sit on these pins. Now, solder one side of a 4-inch wire to the hole just after the first cut. For all versions of the Super Controller I, solder the other end of this wire to Pin 7 of the 74LS139 chip just below the 74LS04. For the Super Controller II, solder the wire to Pin 3 of J3 on the controller; you also have the choice of putting on a jumper instead of soldering it. One limitation is that you must use the alternate, eight-byte area for this modification; the other area is only four bytes long, so it cannot be used.

For the power, solder the plus side of a +5V regulated power supply to the hole above the second cut you made on the adapter. Locate Pin 14 on the MEB connector, follow it to the first hole, and connect the ground return of the power supply to it. Insert the clock/parallel board piggyback on Pin 17 that you just installed. Plug the hard disk/serial board into the MEB connector. Connect the controller into the computer. That is all there is to the hardware part of this project.

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec. Tony's username on Delphi is DISTO.

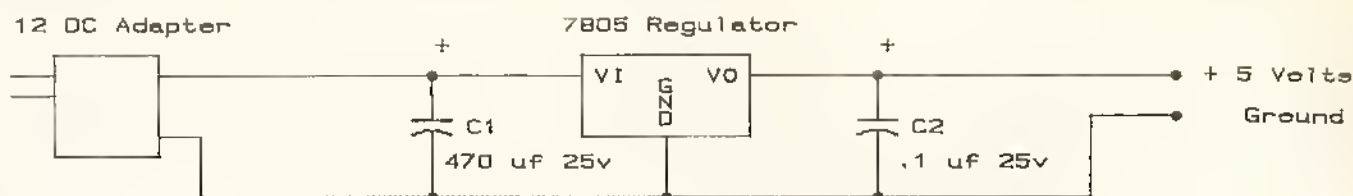


Figure 1: 5-volt Power Supply

Now for the software patches for the OS-9 drivers. One of the great things about OS-9 is the ability to adapt software to hardware. In most cases, the way designers connect devices to a computer is very similar. Where these devices are connected, as far as the memory map goes, can be very different. The writers of OS-9 had this in mind when they wrote it. Along with the necessary software drivers, the fathers of OS-9 created small blocks of memory called descriptors. These descriptors have information on the physical aspects of the hardware they control — things like how many tracks on a disk or what baud rate the device works at.

One of the pieces of information included in these device descriptors is the memory location of the hardware. This tells the software driver exactly where in memory the hardware can be found. Now, what I did above is change the hardware location of the hard disk registers and the serial (RS-232) registers. The only way the software driver knows this information is through the device descriptor. All we have to do now is change the values in the proper device descriptors to the new memory locations, and we are home free.

Since the clock and parallel hardware is not changed, no changes to the de-

scriptors are needed. However, we do need to change the hard disk and serial descriptors. Let's start with the hard disk adapter. A little knowledge of OS-9 is needed to make these changes. On the disk that came with this adapter are drivers and descriptors. The $\angle h0$ descriptor used for the hard disk adapter needs to be changed. To change it, we will use the OS-9 command Debug. As part of the descriptor, there is a three-byte address that represents the area in the memory map where the hardware resides. This data is set for the hardware memory; but since we changed the software, we must now change the software. The third byte in this address is \$53. You now have to change this value to \$5A. To do this, execute Debug and link to the $\angle h0$ module. Press ENTER until you pass the series of two bytes, \$07 and \$FF; when you see the next value, \$53, type =5A to change it to the right value. Press Q to exit.

The other device descriptor to change is the serial one. Follow the same procedure as above, except use the $\angle T2$ descriptor. The byte to change may be one of two values. If it is the original, unmodified Tandy descriptor, the value to look for is \$68. If you have already changed this value, you will know that it is \$54. In either case, change it to \$5C.

If you want to make this change permanent, the OS-9 manual will describe just how to do this.

There will be a lot of cables protruding from this contraption: the disk drive cable, the hard disk cable, the printer cable, the RS-232 cable and the power cable. I bent and shaped all the cables so that they were parallel to the drive cable, and then I bundled them together with a tie-wrap. As I mentioned before, the cover will no longer fit; so I made another cover from a small piece of tin, bending, cutting and shaping it to fit. I did not bother to paint it, but you might.

The only thing left is the power supply. Radio Shack has all the parts necessary to build a regulated power supply. You will need all the parts listed in Figure 1. Most of the parts are not too critical and can be substituted for the nearest part. The transformer you must use is a DC adapter. A 12-volt adapter at about 150mA will do just fine.

I have recently joined Delphi. You can find me there as D1STO. Drop me a line if you have any problems or if you just want to say "hi." I'm not on at any regular time, but look for me in the OS-9 and CoCo SIGs.

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Reviewed in Rainbow
February 1988 pg. 133
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Some time has been spent in this column discussing how to download programs from the CoCo SIG databases. Enough information has been given that your first attempts at downloading shouldn't be too painful. At the same time, each user develops many shortcuts in downloading files. These shortcuts will be different for most people and I leave it to you to find the methods that work best for you. It doesn't take long to learn the ropes, and pretty soon you will find downloading becomes second nature.

Tape-Based Users

I feel it safe to say most Color Computer owners have at least one disk drive connected to their CoCos. However, many of the newer members to the CoCo Community don't. The reason is irrelevant — if their interest in the CoCo continues to grow, chances are they will add a drive as soon as they can. The point is, downloaded files often must be handled a little differently on tape-based systems than on disk-based CoCos. This is especially true of machine language files.

Because of the difference in the way disk and tape systems handle the addressing information for ML files, different approaches must be taken when saving a downloaded file. Rather than spend more time on this issue here, we will be publishing an article next month discussing tape users and Delphi. Written by database manager Don Hutchison (DONHUTCHISON), this article details the steps that must be taken by tape-based users before certain types of downloaded files can be run.

Program Bugs

Whenever a file is uploaded to the CoCo SIG and submitted for publication in the database areas, that file is first sent to a private area used by the SIG staff. This file is officially in the database area and can be manipulated by the staff, but it cannot be seen by the general SIG public. This allows the staff to download the program and make

Database downloading, Part 3

Downloading Problems

By Cray Augsburg
Rainbow Technical Editor

sure it works — to determine if the file is ready to be published. This download/error checking process is usually handled by Don Hutchison.

Every effort is made to ensure that the programs in the public areas of the database work. If a problem is found, the uploader is asked to see that the file is fixed before it is published. However, some problem programs do get through. The number of submissions each month preclude full Beta-testing of uploaded programs.

If you download a program and run

it only to find an error, I imagine you will feel cheated. The few complaints we receive about program errors are often very vicious. They denounce the programmer's abilities. They are also abusive to the SIG staff by implying we put bug-ridden programs in the databases intentionally. Keep in mind that we don't intentionally publish files that contain errors. Aside from the obvious ethical considerations, it takes a lot of work and time to clear up those errors. And I doubt if many people would upload error-ridden programs knowing their name will appear along with the program.

One of the best ways to address such a situation is to contact the author and/or Don Hutchison via Mail. Explain the problem as clearly as possible. Let us know what errors you are receiving and in what program lines they occur. Include information about your Color Computer setup. Describe the steps you are following in trying to run the program. With this information, it becomes possible to get a clear image of the problem and work toward a solution. After a solution has been found, the program will be changed accordingly so other users don't encounter the same problems.

On a related note, problem programs are removed from public view. This is

Database Report

By Don Hutchison
Rainbow CoCo SIG Database Manager

SIGop Greg Law (GREGI) has opened a new topic in the database section of OS-9 Online. The topic is called "Revised OS-9 Users Group Material" since it will be stocked with the newer OS-9 Users Group files. (The existing Users Group files will remain online, also.)

Both RAINBOW SIGs had very active months, in the forum areas as well as in the databases. We had a lot of interesting, useful software uploaded to us. Let's check out the new material!

OS-9 Online

In the General topic of the database, Brian Wright (POLTERGEIST) posted the first issue of the humorous *Networks Magazine*. Brian also uploaded another

entertaining file containing the first three issues of *Humus Magazine*. Jason Forbes (COCOKID) uploaded COC0059.BAS, a modified version of the RS-OS9 program that makes RS-DOS disks readable from OS-9. (This version will relocate files if BRAN 0 is already used, and it will allow for larger files.) Kevin Darling (KDARLING) posted a text file describing a recommended hardware fix for the 'fandy FD-502 second drive, which requires a small bit of soldering to correct an incorrectly positioned jumper.

In the Utilities topic of the database, Warren Moore (WJMOORE) uploaded Moore Windows, an archived file containing a collection of shell scripts to change the attributes of a current window device.

Cray Augsburg is RAINBOW's technical editor and has an associate's degree in electrical engineering. He and his wife, Ruth Ann, have two children and live in Louisville, Kentucky. His username on Delphi is CRAY.

done for the protection of other users. In most cases, however, the program won't be moved from view until it is certain a problem exists within the program. We find many times that users don't have the right equipment to run a given program. Or, the steps they are using to run it are incorrect. And in the case of an ASCII download, line noise often becomes a problem.

Many times, beginning downloaders will download a BASIC program and save it to disk, only to find the program won't load when they try to run it. More often than not, this is the result of saving a tokenized BASIC program in ASCII format or vice versa. In many cases, simply loading the file back into your terminal program's huffer and resaving it in the correct format will rectify the situation. Sometimes, and also with machine language programs, you will have to download the file again and save it correctly before you will be able to use it.

Don Hutchison does an excellent job of tracking down user/program problems and finding agreeable solutions, and I feel he is well deserving of a pat on the back. I'm sure those of you who have dealt with him will agree.

Downloading Time

It can take quite a bit of online time to download a few simple programs at 300 baud. It is for this reason most of the SIG staff go online at either 1200 or 2400 baud. If it is within your means,

I suggest using a 1200 baud modem. The drastic decrease in download time will allow you to more fully avail yourself of other areas of the CoCo SIG for the same amount of connect time.

Uploading

We are still offering free time for uploading to those who want to share their creations with other users, and we hope you will take advantage of this offer. Many find it very rewarding to help other people with similar needs and problems. Besides, uploading is a great way to gain new insight on file transfers.

I have covered the topic of uploading files to the CoCo SIG in past issues and will do so again in the future. It is this involvement, along with the feeling of being connected to other members of the CoCo SIG, which makes the SIG what it is. Think of it this way: If nobody uploaded any programs, would you *really* be as interested in going online? There would be nothing there for you to download.

Before we move into discussion next month of Workspace and its uses, I ask that you do a little "homework." Go ahead and look into Workspace. If you haven't done so already, try to upload and submit some files. Once you get into it, you might realize it isn't really all that hard to do. Just think of it as reverse-downloading. And if concern about the quality of your submission is holding you back, remember the old phrase, "nothing ventured, nothing gained!" □

Users can change the type of screen, change the default colors, toggle bold-facing on graphics windows and switch standard font size on graphics windows. Mark Kowit (MARKKOWIT) uploaded a decimal Display command and a Palette command utility that makes it easier to change palette values. Jason Forbes also posted DIGICLOCK, which displays a continuous digital clock and date in its own window. Source code is provided for easy modification.

In the Patches topic of the database, Jason Forbes updated his GamePatches file for fixing *Koronis Rift* and *Rescue on Fractalus*. Roger Smith (SMUDGER) provided us with SPATCHW, a patch for *TS-Spell* to allow for a single personal dictionary in the <DD> data directory.

In the Telecom topic of the database, Chris Bergerson (CHRISB) provided us with ACCESS.AR, a "user-friendly" interface for the Xcom9 terminal program. It stores frequently used numbers with the ability to alter the numbers. The archived file contains BASIC99 source, the packed program,

a sample number file, and documentation.

Ron Bihler (RAAB) posted a corrected version of READMSG and furnished Version 1.01 of RIBBS, an OS-9 Bulletin Board System. RIBBS requires an RS-232 Pak, an auto-answer modem, and at least two drives. Greg Law furnished an autobaud version of TSBG/TSMon. This version contains modules to support both the standard Hayes command set as well as the extended set.

In the Graphics & Music topic of the database, Mark O'Pella (MDOPELPHI) uploaded his rendition of Elton John's "Your Song" in UMuse format. Steve Fravel (OSFANATIC) posted an archived file containing two VEF pictures for Grateful Dead fans. The first picture is from the cover of the *Steal Your Face* album, while the second is from the back of the *Shakedown Street* album. Boh Montowski (GRAPHICSPUB) kindly provided 34 archived "Clip Art" groups for the CoCo 3's *Home Publisher* software. Each group, by the way, contains about 20 pictures! Thanks, Boh!

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In the Programmers' Den topic of the database, Greg Law posted a sample application for *Multi-Vue*. Greg's grouping consists of four source files written in RMA assembler that are the beginning of an application designed to run under *Multi-Vue*.

CoCo SIG

In the General topic of the database, **Marty Goodman** (MARTYGOODMAN) posted three humorous text files provided by **Rick Adams** (RICKADAMS). Titled *Mongrels Unite!*, these files describe the madcap experiences of one computer scientist in the course of filling out forms for a security clearance in which he is asked for his "race." **Heath Dingwell** (HEATHSTFR) uploaded a comic text file containing "bloopers" written by school kids during their history classes. Heath also uploaded a tabulation of some popular "800" numbers.

In the CoCo 3 Graphics topic of the database, **Christopher Smith** (POSSUM-DARK) sent us a Macintosh picture of Mao Tse Tung. **Marlin Simmons** (LINLEE) uploaded FONTEDIT.ARC, followed closely by a revised version. **James Farmer** (MODEMASTER) uploaded two original RAT pictures, Cosmic War and Spacewarp, and an original *CoCo Max 3* picture called Starship. **Bob Whurton** (BOBWHARTON) uploaded his drawings of the Boston

Celtics' logo, on request of a user.

In the Utilities and Applications topic of the database, **Jim Shoop** (BAZAR) uploaded his binary-to-BASIC converter program. **Michael Schneider** (MSCHNEIDER) uploaded a compression utility called DSHRINK for compressing WEFAX pictures into a single, smaller file. DSHRINK will also expand the file into the corresponding pictures on a WEFAX disk. **Ken Halter** (KENHALTER) uploaded some patches for CoCo 3 BASIC and a *PenPal* patch for the CoCo 3. **Heath Dingwell** uploaded his program for printing disk directories, and **Robert Pierce** (RPIERCE) posted a CoCo 3 memory-scanning program.

In the Games topic of the database, **Paul Dion** (PAULNORMAND) uploaded *Tipperwars*, his latest game creation. **Heath Dingwell** posted a friend's *Alien Invasion* game. **Gregory Clark** (GNOME) provided an entertaining game program called *Wimpy*. Greg asks, "How good are you at running and trying to hide? Are you cool when you can't fight back?" *Wimpy* is for the 128K CoCo 3.

In the Classic Graphics topic of the database, **Jason Forbes** posted *CHRIST.ARC*, a series of *CoCo Max 2* graphics containing Biblical quotes originally drawn by Tim Ashley. **David Mills** (DAVIDMILLS) uploaded a moving graphic of the world as it turns. This program is

an interesting use of the graphics abilities of the CoCo.

In the Music and Sound topic of the database, **Mike Stute** (GRIDBUG) kindly provided us with five new tunes, sure to be popular among music lovers. **Heath Dingwell** uploaded "Shilo" by Neil Diamond. **John Barrett** (JBARRETT) posted four outstanding pieces for *Musica II*, and **Orman Beckles** (ORMAN) uploaded two printer drivers for use with the *Lyra* package. **Mark Raphael** (MARKRAHAELE) uploaded a collection of music files for *Musica II*, as well as some stand-alone files. Mark included classical, pop and modern pop music files for a well-rounded offering. **George Hoffman** (HOFFBERGER) posted Pink Floyd's "Summer '68."

In the Data Communications topic of the database, **Michael Schneider** uploaded a compressed file containing two WEFAX pictures. Michael also furnished a compression and decompression utility in the Utilities topic of the database in the hope that others will begin to upload WEFAX pictures. **Fred McDonald** (FREDMCD) posted a patch file for Version 4.0 of *Ultimaterm*. ADOS-3 users should have this file, since the patch makes *Ultimaterm* compatible with ADOS-3.

As you can see, the RAINBOW SIGs are always very active! No matter what you're interested in, you'll probably find it here.



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PCWRITE	write file to PC disk	FLEXWRITE	write file to FLEX disk
PCRENAME	rename PC file	PCFORMAT	format PC disk
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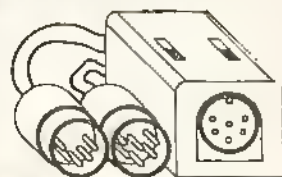
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Drive Support

I recently received a 20-Meg hard drive with a WD 1001-05 controller card. The drive was taken out of a Southwest Technical, and I figured that since the SW ran on a 68B09 micro-processor (same as the CoCo 3) it would work on the CoCo. If I am correct, what do I need to do to interface them? If not, what Western Digital Controller does the CoCo use? I also have a Shugart 3.5-inch drive. Is there any way I can use this under RS-DOS? Would it work using OS-9 Level II? I use Stylograph as my word processor on the SW. I was told that I could get this for my CoCo. Where can I find it? My system consists of 128K CoCo 3, FD-500 disk, DMP-105 printer, TP-10 printer, monochrome monitor and a modem. I also have a bunch of gray and white CoCo 1s and 2s.

John Starlie
Union Gap, WA

The four major suppliers of hard disk systems for the CoCo 3 are Burke & Burke, Frank Hogg Laboratory, Owl-Ware and RGB Computer Systems, all advertisers in this magazine. Contact them for support of your drive. Stylograph is available for the CoCo under both OS-9 Level I and Level II. Contact Great Plains Computer Company, P.O. Box 916, Idaho Falls, ID 83402. (208)529-3210.

Copy-Protection Makes No Sense

I'm looking for one of the best copy-right programs around. I know a while ago you suggested Anti-Pirate by Microcom but it's no longer advertised. If you were going to publish a program under your own name, what would you choose?

Chris Green
Carmichael, CA

Richard Esposito is the principal engineer for BDM Corporation. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.

Richard Libra is a simulator test operator for Singer Link Simulation Systems Division.

D O C T O R



A S C I I

By Richard E. Esposito
Rainbow Contributing Editor
with Richard W. Libra

I would neither market a copy-protected program nor would I encourage anyone else to market or purchase one. Even Lotus Corporation (the last major holdout) is abandoning copy-protection in its next release of 1-2-3. Protection makes no sense. It discourages legitimate users from purchasing your products. It challenges pirates to break the protection scheme; to prove they've done it, they make copies for their friends. The only successful protection schemes are hardware-based; if done right this would price you out of the CoCo market.

A Fix for VIP Speller?

I used your CoCo 3 fix for VIP Speller ("Doctor ASCII," March '88 RAINBOW). It worked fine for VIP Writer and VIP Calc; however, I can find no such sequence of characters in my VIP Speller. Do you have a fix for VIP Speller?

Jack Coleman
Joliet, IL

Sorry, but I do not have a copy of the old VIP Speller. There is now a new CoCo 3 version of VIP Writer/VIP Speller that uses the CoCo 3's 80-by-24 display mode.

Display Enhancement

How do I change from amber background/black text to black background/amber text and utilize the entire screen (eliminate the border) on boot-up and in Telewriter-64? I have a gray-case color computer, ADOS Version 1.01, video output board I built from Tim McIntosh's article in RAINBOW (September 1986), and a Magnavox 80 computer monitor. I am considering changing to the MC6847-T1 VDG (RAINBOW October, November and December 1986). Will this chip change solve my problems, or is there an easier method?

David Gierhart
Fremont, OH

With the CoCo 3, you have control over the palettes and can therefore get any color combination you want in any mode. With the earlier CoCos, the color combinations are hard-wired. Howard Cohen wisely designed Telewriter-64 to use dark text on a light background to maximize readability. Light text on a dark background using a PM00E4 screen with Telewriter-64 will result in a less legible display. The MC6847-T1 would give you true lowercase in the 32-by-16 display, but it makes little sense spending money to enhance the display of an older CoCo when, with a few more dollars, you can move up to a CoCo 3 and get a real 80-by-24 display with your Magnavox 80 computer monitor.

Erasing the Errors

I have a 64K CoCo 2 with an FD-501 disk drive. When I try to load a machine language or BASIC program I get an FD Error. When I try it several times it works. When I list a program and use the SHIFT @ command, I am sometimes given a TM Error. It also does other strange things at times. Any suggestions?

Jeff Warren
Maymesville, NC

Try cleaning the contacts on your disk controller where it connects to the ROM pack port. A rubber eraser will remove the black oxidation (the root of the problem) and restore the silvery finish and electrical continuity.

What is the best way to access both sides of a double-sided drive on the CoCo 3 other than using ADOS?

Steve Morrison
(STEVENM)
Newton, NC

R The drive selections in Disk Color BASIC are controlled by four addresses corresponding to the four possible drives allowable in Disk Extended Color BASIC (DECB):

	DECB1.1	DECB1.0
#0	55453	55210
#1	55454	55211
#2	55455	55212
#3	55456	55213

Normally, the addresses corresponding to slots #0 through #3 contain the values 1, 2, 4 and 32, respectively, but you can change these on the CoCo 3 since these values are in RAM. If, for example, you poke Slot #0 with 2 and Slot #1 with 1, your Drive 0 will act like a Drive 1 and your Drive 1 will act like a Drive 0. In a double-sided system, you cannot have more than three drives, since, with these, Slot #3 is used for side selection. So, if you want #2 to be the back of Drive 0, poke #2 with 33 (32+1); and if you want #3 to be the back of #1, poke #3 with 34 (32+2).

Missing Voltage

I have a CoCo 2 and a CoCo 3 and two FD-500 drives. Also, I am using a 26-3124 Multi-Pak interface. I have installed the upgrade board in the MPI as outlined by Marty Goodman in the January 1987 issue of RAINBOW. Everything works fine as long as the FD 500 disk controller is plugged into the MPI. But when I plug the disk controller directly into the CoCo 2 or the CoCo 3 ROM port, I get nothing but garbage. The screen either becomes black or shows a vertical pattern of colored @s. Can you help me?

Chris Voelker
Banning, CA

R The original disk controller was made for the CoCo 1, which supplied 12 volts at the ROM pack port. The newer CoCo 2 and CoCo 3 require either a Multi-Pak, which supplies the missing voltage, or a newer 5 volt-only controller.

Willard Conner, in your March 1987 column, wrote in wanting to be able to use double-precision arithmetic. Radio Shack has a book called TR-S80 Color Computer Programs, in which there is a program using that feature. I was able to use it, but never fully understood it. Maybe it will help him, however.

Harold Hendricson
McAllen, TX

R Thanks for the info.

Tracking TCE

I have just read your September 1987 column and was interested in your reference to TCE Systems. Unfortunately, I am not one of those who use Delphi, and I would appreciate it if you would let me know the address of TCE Systems.

Karl Cosper
Professor of Physics
Cleveland, OH

R All I have on TCE is two phone numbers: (800) 4TC-4TCE and (301) 963-3848. Their last advertisement in THE RAINBOW was in the February 1987 issue. KENSHUNK is no longer on Delphi.

ROM Pack Patches

I have a CoCo 3 and an FD-502 disk drive. Recently I backed up my ROM packs to disk using David Dawson's "Pak to Disk Transfer" in the December 1987 issue of RAINBOW. It worked great until I tried it on a newer ROM pack from Radio Shack. It seemed to save and load properly, but when I typed EXEC the computer locked up, flashing streaks on the screen, and could not be terminated by pressing reset. What is the exact memory location for a ROM pack in a CoCo 3? The disk manual is not too clear in this area. Is there a poke I should use before EXEC, or is there something wrong with this patch?

Dale Szabo
Prince Albert, Saskatchewan

R Patches for some of the newer ROM packs to be used with Dawson's program appeared in the March '88 installment of this column. If anyone can add to this list, write to me and I'll include your additional patches along with your name in a future issue.

I own a DCM Modem Pack Version 1.00.00 with the built-in terminal program. I was wondering if there was any way I could use a different terminal program with it. I would also like to know if there is any way I can add a bigger buffer in the DMP-105 printer. Is there any program available for the Color Computer that changes Commodore programs to the CoCo and vice versa?

Lucas Korytkowski
Toronto, Ontario

R The public domain program MikeyTerm, available for \$10 from Mike Ward, 1807 Cortez, Coral Gables, FL 33134, is configurable to work with your DCM Modem Pack. External printer buffers that hook between your computer and printer are commercially available. With the proper software, you can allocate otherwise unused RAM in a 64K plus CoCo 1, 2 or 3 for a print buffer.

Double-Sided Disk Directories

Is there a way to use DIR Alpha and DIR Print (February '88 issue, Page 80) to access and print the directories of my double-sided disks? My system consists of the following: CoCo 2 with 64K Extended BASIC, one double-sided drive with HDS controller and an Epson LX-800 dot matrix printer. Both of the programs work great, but only for Side 0 of the drive. My system is set up for 0 and 2 (0 is the default). I access Side 2 of the disk by typing in LOADM filename:@. The DOS I'm using is OwdOS Custom Modified Version 1.1 ©1982 Tandy Lic. by Microsoft.

Jonquin Cheo
New Market, AL

R If the DRIVE command is implemented, set your OwdOS to access the back side of the disk and then run the program. Better yet, set up the programs as subroutines and make the DRIVE command part of the program.

For a quicker response, your questions may also be submitted through RAINBOW's CoCo SIG on Delphi. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type ASK for "Ask the Experts" to arrive at the EXPERTS> prompt, where you can select the "Doctor ASCII" online form which has complete instructions.



If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. Remember, keep your ideas specific, and don't forget this is BASIC. All programs resulting from your wishes are for your use, but remain the property of the author.

Enough. OK? I've gotten your message. Several months ago I printed some corrections to make five older "Wishing Well" programs work more efficiently on the CoCo 3. Since then, I have been deluged with letters from readers telling me that to change the color set from blue to red on CoCo programs using artifact colors, I only needed to hold down the F1 key while pressing the reset button.

Mea culpa, mea culpa, mea maxima culpa! (Latin for saying, roughly, "Sorry, but I made a mistake. It's all my fault!") Remember, I am still relatively new to all the features on the CoCo 3. I have not had the chance to do all the reading that some of you have done since getting your new machines. My time on the CoCo has been spent in creating new programs for you.

In any case, thank you for pointing that out to me and keeping me on my toes. Still, having these programs corrected will solve the problem for those who did not know about the reset and F1 either. It is always nice to have a program run correctly the first time without having to go through any keyboard gymnastics.

Comma, Comma Down Doobie Do Down Down

(Sorry, but I couldn't resist the pun.) In any case, this month's "Wishing Well" program will help train users on the correct grammatical use of the comma. Correct usage of commas is a skill that many students have great difficulty mastering. Five general rules must be mastered in order to correctly

Training on correct comma usage

CoCo Uses Some Comma Sense!

By Fred B. Scerbo
Rainbow Contributing Editor

use commas in English grammar. They are:

- 1) Use commas between items in a list.
- 2) Use commas when addressing someone in a sentence.
- 3) Use a comma to separate a quotation from the rest of the sentence.
- 4) Use a comma to set off the words "yes" or "no" in a sentence.
- 5) Use a comma before a conjunction to separate two complete ideas in a sentence.

Not every student can easily memorize these rules. They often become second nature only by repeated use. That's where the new program comes in.

Comma Sense

This new program is designed both to review the rules of comma use and to quiz the user on the correct placement of commas in a sentence. The program will work in 16K Color Extended BASIC. (Sorry, no Speech/Sound Pak for this one.)

The program as listed has 25 sample sentences covering all five rules. The sentences are stored in DATA statements and can be replaced by your own sentences if you want. I have even included

a subroutine allowing you to have a sentence with quotation marks in it, which is often difficult to do when using either DATA statements or string variables. More on that later, though.

Running the Program

When you run the program, our title card will ask whether you want Instruction or Quiz. Pressing I will review the five rules for you and tell you how to use the program. Pressing Q will cause the program to go directly to the quiz. The instruction segment is self-explanatory.

In the quiz you will be given numbered sample sentences in random order. Each sentence will have all commas removed by the program. You must retype the sentence with the commas in the correct places. The program has the same routine as *Jumble* presented in the May '88 RAINBOW (Page 74). The cursor works much like a word processor in that words will not be split up at the edge of the screen. The backspace key will work to erase any errors made. Pressing ENTER finishes the input.

You must be careful about a few things. First, do not type too quickly or you will get ahead of the program. Secondly, be sure to put one space after every comma to match the original sentence in memory.

When you think you have the sentence typed in correctly, press ENTER. If the sentence is correct, you will be told so. If it is not, you will be given two more chances to correct it by backing up with the cursor to your mistake. After the third try you will be shown the error, and the correct sentence will be shown to you.

You may check your score at any time by pressing the @ key. You may return to the quiz by pressing C for continue.

Adding Your Own Sentences

It is actually quite simple to add your own sentences to the program. You may add up to 50 sentences to the program in DATA statements starting with Line 1000. To delete my information type DEL 1000-4999 and press ENTER. This will ensure that the last line in the program will be 5000 DATA END. If you accidentally kill this line, be sure to re-enter it. To add your own information, simply type in a sentence with commas and wrap it in quotation marks: 1000 DATA "SAM, COME HERE."

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

If you want to type a statement already using quotation marks, naturally you cannot put quotes in quotes. Therefore, whenever you wish to have quotation marks appear in the statement, use an asterisk (*) instead: 1010 DATA "HELLO,* HE SAID." The * takes the place of the quotation mark. The program will re-interpret the data before it is used and print an actual quotation mark on the screen. (The screen will show the message "Please stand by," while this is being done.)

Remember, you may only add up to 50 statements. You may make them as easy or as difficult as you like, depending on the needs of the student using the program. You may also want to include more than one usage of the comma in the same sentence.

Try it out. I think you will agree that the program accomplishes its goal quite nicely.

Special Thanks

Several months ago I put out a request for old, used Color Computers for use with our special needs students in the school system in which I teach. I am extremely grateful to those of you who have sent recorders, computers, cables, printers, disk drives, programs and, most of all, old CoCos. Our high school resource room is now at full capacity. Every student who needs to use a machine has one.

Therefore, I have started placing the extra machines we have received at the elementary level with our special needs students there. So far, I have set up

three additional classrooms for handicapped students where no computers were allocated before. You cannot imagine how overjoyed the teachers are to receive these machines. The kids are thrilled, too.

Most people have requested their names not be listed here in the magazine. I will honor that request. If you have not yet received your thank-you note, you will shortly. Again, I thank you from the bottom of my heart for your generosity. Anyone else who may have an old CoCo collecting dust may still contact me at my home address or at my home phone, (413) 663-9648. Any donations made to a school system are tax-deductable, and our school system can supply a receipt for your tax purposes. □

40	.....137	340	.....157
80	.....5	425	.....206
150	.....29	510	.....197
190	.....209	1120	.....204
260	.....48	END	.....178

The listing: COMMAS

```

1 REM *****
2 REM *      COMMA SENSE      *
4 REM *      BY FRED B.SCERBO  *
5 REM *      60 HARDING AVE.   *
6 REM *      NORTH ADAMS,MA 01247 *
7 REM *      COPYRIGHT (C) 1988 *
8 REM *****
9 CLEAR3000:CLS0:PRINTSTRING$(32
,188);STRING$(32,204);:FORI=1TO2
56:READA:PRINTCHR$(A+128);:NEXT
10 PRINTSTRING$(32,195);STRING$(
32,179);
15 DATA46,44,44,44,44,44,42,37,4
4,44,44,44,45,32,46,44,45,44,44,
42,37,44,44,46,44,45,32,46,44,44
,44,45
20 DATA2,,,,,32,32,37,,,,32,37,
,42,,32,,32,42,37,,32,32,32,37,3
2,46,44,44,44,45
25 DATA3,35,35,35,35,35,42,37,3
5,35,35,35,39,,42,,32,32,32,42,3
7,,32,32,,37,,42,,64,37
30 DATA115,115,115,115,115,,115,
115,115,115,115,,115,114,,113,
112,115,115,115,115,115,115,,115
,115,115,115,115,115
35 DATA122,,,,116,,122,,,,116,,1
22,125,114,,117,,122,112,,,,116
,,122,112,,,,116
40 DATA123,115,115,115,115,,123,
115,115,114,,122,112,125,114,,1
17,,122,,,,,123,115,115,114,,

```

```

45 DATA,,,,,117,,122,112,,112,,1
22,,112,125,114,117,,122,,,,,1
22,,,,,
50 DATA123,115,115,115,119,112,1
23,115,115,115,119,112,122,,12
5,119,,123,115,115,115,115,119,1
12,123,115,115,115,115,119
55 PRINT@419,"      BY FRED B.SCE
RBO      ";
60 PRINT@453,"      COPYRIGHT (C) 19
88      ";
65 PRINT@483," <I>NSTRUCTIONS OR
<Q>UIZ ";
70 X$=INKEY$:XX=ROUND(-TIMER):IFX$
="I"THEN75ELSEIFX$="Q"THEN220ELS
E70
75 CLS:PRINT@34,"THIS PROGRAM IS
DESIGNED TO      HELP YOU LEARN
THE CORRECT      USE OF THE 'COM
MA' IN A      COMPLETE SENTEN
CE.":PRINT@194,"YOU WILL BE GIVE
N A SENTENCE      WHICH HAS ALL TH
E COMMAS IN      IT REMOVED."
80 PRINT@322,"YOU MUST RE-TYPE T
HE SENTENCE      SO THAT IT IS CORR
ECT & MAKES      PROPER USE OF THE
COMMA."
85 PRINT@450,"PRESS <ENTER> TO C
ONTINUE.";
90 IFINKEY$<>CHR$(13)THEN90
95 CLS:PRINT@34,"OUR FIRST RULE
WHEN USING      COMMAS REQUIRES
THAT WE USE      COMMAS BETWEEN
THINGS IN A      LIST."
100 PRINT@194,"HERE IS A SAMPLE
SENTENCE.":PRINT@258,"THE THREE
STOOGES ARE LARRY,      MOE, AND C
URLEY."
105 PRINT@354,"WE WOULD PAUSE AF
TER EACH      COMMA WHILE READI
NG ALOUD."

```

```

110 GOSUB115:GOTO130
115 PRINT@450,"PRESS <ENTER> TO
CONTINUE.";
120 IFINKEY$<>CHR$(13)THEN120
125 RETURN
130 CLS:PRINT@34,"OUR SECOND RUL
E WHEN USING          COMMAS REQUIRE
S THAT WE USE          COMMAS WHEN WE
ARE CALLING          SOMEONE'S NAME
."
135 PRINT@194,"HERE IS A SAMPLE
SENTENCE.":PRINT@258,"JIM, COME
HERE SO I CAN SPEAK WITH YOU."
140 PRINT@354,"WE WOULD PAUSE AF
TER THE          COMMA WHILE READI
NG ALOUD."
145 GOSUB115
150 CLS:PRINT@34,"OUR THIRD RULE
WHEN USING          COMMAS REQUIRE
S THAT WE USE          COMMAS TO SEPA
RATE QUOTATIONS      FROM THE REST
OF A SENTENCE."
155 PRINT@194,"HERE IS A SAMPLE
SENTENCE.":PRINT@258,CHR$(34)"GO
ANSWER THE DOOR,"CHR$(34)" HE":
PRINT" SAID AS HE ENTERED THE R
OOM."
160 PRINT@354,"QUESTION MARKS OR
EXCLAMATION POINTS MAY BE USE
D ALSO."
165 GOSUB115
170 CLS:PRINT@34,"OUR FOURTH RUL
E WHEN USING          COMMAS REQUIRE
S THAT WE USE          COMMAS TO SET
OFF THE WORDS        YES OR NO."
175 PRINT@194,"HERE IS A SAMPLE
SENTENCE.":PRINT@258,"NO, YOU MA
Y NOT HAVE SOME ICE  CREAM BEFO
RE SUPPER."
180 PRINT@354,"WE AGAIN WOULD PA
USE AFTER          THE COMMA WHILE R
EADING ALOUD."
185 GOSUB115
190 CLS:PRINT@34,"OUR FINAL RULE
SAYS THAT WE          MUST USE A COM
MA TO PAUSE IN        THE MIDDLE OF
A SENTENCE            BEFORE A CONJU
NCTION."
195 PRINT@194,"HERE IS A SAMPLE
SENTENCE.":PRINT@258,"WE WENT TO
THE SUPERMARKET,      BUT IT WAS
NOT OPEN."
200 PRINT@354,"THIS IS USED WHEN
WE HAVE TWO          DIFFERENT THINGS
STATED."
205 GOSUB115
210 CLS:PRINT@34,"IF YOU DO NOT
GET THE CORRECT      ANSWER, YOU WI
LL BE GIVEN A         CHANCE TO TRY
IT AGAIN. YOU         MAY CHECK THE
SCORECARD BY          PRESSING THE <
> KEY. YOU MAY        THEN RETURN TO
THE PROGRAM BY        PRESSING <C> T

```

```

O CONTINUE"
215 PRINT@290,"WHEN TYPING YOUR
ANSWER BE          SURE TO PUT A SPA
CE AFTER A          COMMA. BE SURE TO
TYPE SLOWLY!":GOSUB115
220 CLS0
225 DIMAO(51),A$(51),B$(51),NP(5
1)
230 CLS0:GOTO265
235 D=0
240 IFLEN(J$)<=27THEN255
245 FORT=27TO0STEP-1:IFMID$(J$,T
,1)=" "THEN260
250 NEXT
255 W$=J$+C$:F=LEN(W$):PRINT@M+D
,W$;STRING$(X-F,32):RETURN
260 W$=LEFT$(J$,T):C$="":W$=W$+C
$:F=LEN(W$):PRINT@M+D,W$;STRING$(
X-F,32):C$=D$:J$=S$+RIGHT$(J$,
(LEN(J$))-T):D=D+32:GOTO240
265 FORJ=1TO50:READ A$(J):IFA$(J
)="END"THEN275
270 NEXTJ
275 CLS0:J=J-1
280 FORI=1TOJ
285 AO(I)=RND(J)
290 IFNP(AO(I))=1THEN 285
295 NP(AO(I))=1:NEXTI
300 FORP=1TOJ:KL=0
305 CLS:PRINT@232,"PLEASE STAND
BY":A$="":B$="":R$="":C$="":D$="
":S$=" "
310 Q$=A$(AO(P)):K=LEN(Q$)
315 A$="":FORI=1TOK:L$=MID$(Q$,I
,1):IFL$="*"THEN A$=A$+CHR$(34)E
LSE A$=A$+L$
320 NEXTI:Q$=A$:A$=" "
325 FORN=1TOK:IFMID$(Q$,N,1)=","
THEN335
330 A$=A$+MID$(Q$,N,1)
335 NEXTN:B$=A$:GOTO360
340 K=LEN(Q$):B$=LEFT$(A$,3):FOR
N=4TOK
345 R=RND(12):IFR>4THEN355
350 B$=B$+" "
355 B$=B$+MID$(A$,N,1):NEXTN
360 CLS:PRINT@35,"ADD COMMAS TO
EXAMPLE #";P:M=96::J$=" " +B$:X
=31:GOSUB235
365 M=289:PRINT@289,"=>" +CHR$(12
8);
370 X=29:C$=CHR$(128):D$=CHR$(12
8):S$=" "
375 Y$=INKEY$:IFY$="@ "THEN460ELS
EIFY$=CHR$(13)THEN395ELSEIFY$=CH
R$(8)THEN385ELSEIFY$=" "THEN375
380 R$=R$+Y$:J$=" " +R$:PRINT@29
1,"";GOSUB235:PRINT:GOTO375
385 IFLEN(R$)<1THEN375
390 M=289:L=LEN(R$):R$=LEFT$(R$,
L-1):PRINT@M,"";J$=" " +R$:GOSU
B235:PRINT:GOTO375
395 IFR$=Q$THEN400ELSE410

```



```

400 PRINT@480," YOU ARE ABSOLUT
ELY CORRECT!! ";
405 CR=CR+1:GOTO450
410 PRINT@480," SORRY, THAT IS
NOT CORRECT !";
415 IR=IR+1:KL=KL+1:IF KL<3 THEN
440
420 X$=INKEY$:IFX$<>CHR$(13)THEN
420
425 CLS:PRINT@64," THE CORRECT
USE OF THE COMMA IN THIS SENT
ENCE IS:"
430 PRINT:J$=" "+Q$:D$="":C$="":
:X=31:M=192:GOSUB235
435 PRINT@416," PRESS <ENTER> T
O CONTINUE.":GOTO450
440 X$=INKEY$:IFX$=CHR$(13)THEN4
45ELSEIFX$="@"THEN460ELSE440
445 PRINT@480,STRING$(30,32);:GO
TO375
450 X$=INKEY$:IFX$=CHR$(13)THEN4
55ELSEIFX$="@"THEN460ELSE450
455 NEXTP
460 CLS:PRINT@128,"";
465 L=CR+IR:IF L=0 THEN L=1
470 PRINT" NUMBER CORRECT = "
CR
475 PRINT
480 PRINT" NUMBER WRONG = "
IR
485 PRINT:PRINT" STUDENT SCOR
E = ";INT(CR*100/L);"%
490 PRINT:PRINT" ANOTHER TRY
(Y/N/C)";
495 W$=INKEY$:IFW$="Y"THEN495
500 IF W$="Y" THEN RUN
505 IF W$="N" THEN CLS:END
510 IF W$="C" AND P<=J THEN 305
ELSE RUN
515 GOTO495
990 REM ENTER DATA AT LINE 1000
1000 DATA "TODAY WE BOUGHT SOME
SOUP, NUTS, GRAPES, AND BERRIES.
"
1010 DATA "SHE SAID IN A LOUD VO
ICE, *YOU'LL NEED MORE MONEY.*"
1020 DATA "YES, WE HAVE NO BANAN
AS."
1030 DATA "SAM, WHAT IS YOUR NEW
ALBUM CALLED?"
1040 DATA "WE ORDERED THE NEW ED
ITION OF THE BOOK, BUT IT DID NO
T ARRIVE IN TIME."
1050 DATA "YES, YOU CAN COME ALO
NG IF YOU HAVE ENOUGH MONEY."
1060 DATA "IT SNOWED ALL SUNDAY
NIGHT, SO WE DID NOT HAVE SCHOOL
ON MONDAY."
1070 DATA "I'LL HAVE THE BACON,
LETTUCE, AND TOMATO ON RYE."
1080 DATA "TAKE OFF THAT FOOLISH
HAT, HARRY."
1090 DATA "*WE FIND HIM GUILTY A

```

```

S CHARGED,* THE FOREMAN OF THE
URY SAID."
1100 DATA "WE WENT TO THE LAW --
RM OF DEWEY, CHEETUM, AND HOWE."
1110 DATA "SURE, YOU CAN COME BY
ANYTIME YOU WANT."
1120 DATA "IT IS A NICE DAY, BUT
I THINK IT IS GOING TO RAIN LAT
ER."
1130 DATA "DID YOU HEAR WHAT I S
AID, NORMAN?"
1140 DATA "YOU WILL NEED A COLOR
COMPUTER, A DISK DRIVE, A MOUSE
, AND A PRINTER."
1150 DATA "I HAVE READ OTHER MAG
AZINES, BUT THE RAINBOW IS THE B
EST."
1160 DATA "*YOU WILL NEVER GET A
WAY WITH IT,* WARNED THE HOSTAGE
."
1170 DATA "ALICE, GET ME THE FLO
UR, SUGAR, CAKE MIX, AND MILK."
1180 DATA "NO, I DO NOT HAVE ANY
MONEY TO LOAN YOU."
1190 DATA "HE DID NOT GET ALONG
WITH OTHERS, SO HE WENT HOME."
1200 DATA "WE TOOK SALLY, DEBBIE
, HARRY, AND JIM TO THE MOVIES."
1210 DATA "CERTAINLY, YOU CAN CO
ME IN NOW."
1220 DATA "DIDN'T YOU PAY ATTENT
ION TO ME, LARRY?"
1230 DATA "*THIS IS THE WORST DA
Y OF MY LIFE,* SCOTT SAID."
1240 DATA "HE HAD A FEW DRINKS,
BUT HE DID NOT DRIVE HIS CAR."
5000 DATA END

```

CORRECTIONS

"Ye Olde Font" (May 1988, Page 37): Bill Bernico has written to correct an error in his *English Print Font* program. The mistake isn't noticeable unless you print a whole string of 5s on the screen. Currently, Line 280, which defines the character 5, ends with BU10BR10. This line should end with BU11BR10.

"Received and Certified" (May 1988, Page 140): The price and contact phone number are incorrect for the listing of *ReMusic* 1.0. Codis Enterprises can be reached at (817) 283-8571. *ReMusic* 1.0 sells for \$25, not \$12.

For quicker reference, Corrections will be posted on Delphi as soon as they are available in the Info on Rainbow topic area of the database. Just type DATA at the CoCo SIG> prompt and INFO at the TOPIC> prompt.



Barden's Buffer

Can the CoCo Learn?

By William Barden, Jr.
Rainbow Contributing Editor

Can a computer possibly learn? For example, is it possible for your CoCo to learn how to play tic-tac-toe without your programming the winning strategies? Imagine this scenario: You start playing tic-tac-toe with your computer, and it loses at first. However, as it plays, it learns from past mistakes and plays better and better. Finally, it becomes a master tic-tac-toe player, able to beat you in almost every game. In this column we'll look at that question and actually make your CoCo into a learning machine! I'll even ask for your help in playing against the CoCo — but more on that later.

MENACE — A Matchbox Learning Machine

To give credit where credit is due, this whole concept comes from a description of MENACE, a Matchbox Educable Naughts and Crosses Engine, described in Martin Gardner's book *The Unexpected Hanging*. Gardner, the Puzzle Master of *Scientific American* for many years, describes a learning machine made out of 300 matchboxes by Donald Michie, a biologist at the University of Edinburgh.

Michie's matchboxes have a copy of a tic-tac-toe position on their cover (tic-tac-toe is called "naughts and crosses" in Great Britain). See Figure 1. Inside each matchbox are beads of different colors, each bead representing a move. There's a hole in each matchbox so that one bead can be randomly selected from all beads. The color of the bead selected determines the move.

The machine starts first and makes the first move (in fact this is done by someone shaking the matchbox with the "empty" tic-tac-toe matrix on the cover and noting the color of the bead). This matchbox is then left open to indicate that a move of that configuration has taken place.

For each machine move, a human opponent also makes a move. Since the machine started first, it plays odd moves

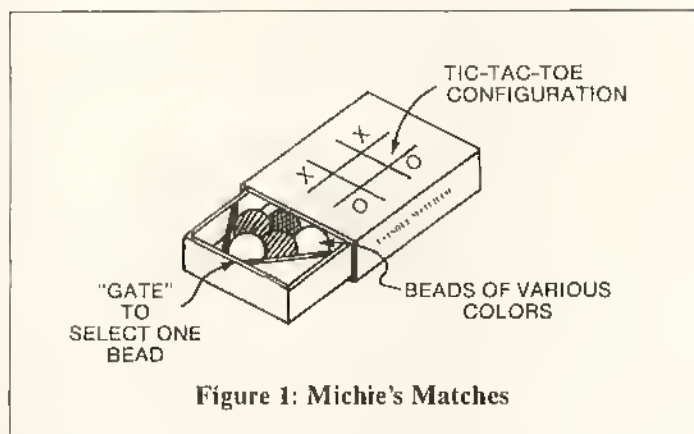


Figure 1: Michie's Matches

— 1, 3, 5, 7 and 9. This means that any time the machine plays, there is an equal number of X's and O's on the tic-tac-toe matrix.

At the end of the game there are several open matchboxes representing the moves that occurred. Each open matchbox has a selected color bead that determined the next move. If the machine won the game, more beads of that color are added to each open matchbox. If the game was a draw, only one bead of that color is added to the matchboxes. If the machine lost the game, one bead of that color is taken from each matchbox.

Over many games, the matchboxes accumulate more beads representing winning moves than non-winning moves. The chance of selecting a winning bead (move) is much greater than that of selecting a losing or drawing bead. Gradually, the machine becomes smarter and smarter.

Tic-Tac-Toe Positions

The tic-tac-toe matrix looks like Figure 2. We'll assign each square a number of 1 through 9, as shown in the figure. For each of the nine squares, there are three possible characters that can be placed into the square — a blank (no move yet made), an O or an X. Instead of a blank, we'll use a dash character, just because it's easier to find the position on a printout.

Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years' experience in the industry covers a wide background: programming, systems analysis and managing projects for computers ranging from mainframes to micros.

1	2	3
-	O	-
4	5	6
-	X	-
7	8	9
-	X	O

Figure 2: Tic-Tac-Toe Matrix Characters and Numbering

<table><tr><td>X</td><td>O</td><td>X</td></tr><tr><td>O</td><td>-</td><td>-</td></tr><tr><td>-</td><td>X</td><td>O</td></tr></table>	X	O	X	O	-	-	-	X	O	<table><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td></tr><tr><td>X</td><td>O</td><td>X</td><td>O</td><td>-</td><td>-</td><td>-</td><td>X</td><td>O</td></tr></table>	1	2	3	4	5	6	7	8	9	X	O	X	O	-	-	-	X	O
X	O	X																										
O	-	-																										
-	X	O																										
1	2	3	4	5	6	7	8	9																				
X	O	X	O	-	-	-	X	O																				
<table><tr><td>X</td><td>X</td><td>O</td></tr><tr><td>O</td><td>-</td><td>-</td></tr><tr><td>X</td><td>O</td><td>-</td></tr></table>	X	X	O	O	-	-	X	O	-	<table><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td></tr><tr><td>X</td><td>X</td><td>O</td><td>O</td><td>-</td><td>-</td><td>X</td><td>O</td><td>-</td></tr></table>	1	2	3	4	5	6	7	8	9	X	X	O	O	-	-	X	O	-
X	X	O																										
O	-	-																										
X	O	-																										
1	2	3	4	5	6	7	8	9																				
X	X	O	O	-	-	X	O	-																				
<table><tr><td>X</td><td>O</td><td>-</td></tr><tr><td>-</td><td>-</td><td>-</td></tr><tr><td>-</td><td>-</td><td>-</td></tr></table>	X	O	-	-	-	-	-	-	-	<table><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td></tr><tr><td>X</td><td>O</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr></table>	1	2	3	4	5	6	7	8	9	X	O	-	-	-	-	-	-	-
X	O	-																										
-	-	-																										
-	-	-																										
1	2	3	4	5	6	7	8	9																				
X	O	-	-	-	-	-	-	-																				

Figure 3: Tic-Tac-Toe String Representation

To make the tic-tac-toe matrix easier to print and process, we'll use a nine-character string, as shown in Figure 3. The character positions of the string are numbered from 1 through 9 and correspond to the tic-tac-toe positions. Several tic-tac-toe configurations are shown, with their corresponding string printouts.

How many different configurations of the tic-tac-toe matrix are there? We can compute that fairly easily on the CoCo. We'll start with no entries, a string of -----, Then we'll increment by one from the left, changing a dash to an O: -----O. The next increment will change an O to an X: -----X. The next increment will change an X to a dash again and add one to the next lower position: -----O-. We'll stop when we get to XXXXXXXXX. The program to do this is shown in Listing 1, and the first few strings are:

```

----- 1
-----O 2
-----X 3
-----O- 4
-----OO 5
-----OX 6
-----X- 7
-----XO 8
-----XX 9
-----O-- 10
-----O-O 11

```

Do you see any pattern here? If a dash stands for an O, an O for a 1, and an X for a 2, we can construct a ternary

number of base three out of the patterns. The pattern -X-O--XXO becomes 020100221. A ternary number is similar to a binary number but uses the digits 0, 1 and 2. In fact there are three to the ninth configurations of tic-tac-toe patterns, or 19,683 patterns. The program in Listing 1 will list them all.

Some of the patterns, though, just can't be. The pattern 000----- consists of three moves of O's and no others. Someone's cheating. Likewise, 000111111 has six X's and three O's, an unequal number of moves and impossible.

The program shown in Listing 2 lists all possible moves that the machine can make if it goes first. Remember that if the machine goes first it is always confronted with a tic-tac-toe configuration with an equal number of X's and O's. We'll use O for the machine's move, by the way.

It turns out that there are 3,139 possible configurations with an equal number of X's and O's. The last four are:

```

XXXXO-000 19535
XXXX00-00 19553
XXX0000-0 19559
XXXX0000- 19561

```

Note that each configuration has a corresponding number based on the original 19,683 configurations. Since most of the 19,683 configurations are not possible, there are gaps in the numbering.

Michie originally used about 300 matchboxes in his manual method of MENACE. That's cheating somewhat. He reasoned that the configurations in Figure 4 were all the same, if the tic-tac-toe matrix was rotated and the mirror image was considered. We'll use the brute force method here and consider all possible configurations without regard to rotations or mirror images.

Possible Next Moves

For each configuration, there are one to nine possible next moves. The ----- configuration, for example, repre-

<table> <tr><td>X</td><td>O</td><td>-</td></tr> <tr><td>-</td><td>-</td><td>X</td></tr> <tr><td>O</td><td>-</td><td>-</td></tr> </table>	X	O	-	-	-	X	O	-	-	ORIGINAL																																		
X	O	-																																										
-	-	X																																										
O	-	-																																										
<table> <tr><td>-</td><td>X</td><td>-</td></tr> <tr><td>O</td><td>-</td><td>-</td></tr> <tr><td>X</td><td>-</td><td>O</td></tr> </table>	-	X	-	O	-	-	X	-	O	90°	<table> <tr><td>-</td><td>-</td><td>O</td></tr> <tr><td>X</td><td>-</td><td>-</td></tr> <tr><td>-</td><td>O</td><td>X</td></tr> </table>	-	-	O	X	-	-	-	O	X	180°	<table> <tr><td>O</td><td>-</td><td>X</td></tr> <tr><td>-</td><td>-</td><td>O</td></tr> <tr><td>-</td><td>X</td><td>-</td></tr> </table>	O	-	X	-	-	O	-	X	-	270°	ROTATIONS											
-	X	-																																										
O	-	-																																										
X	-	O																																										
-	-	O																																										
X	-	-																																										
-	O	X																																										
O	-	X																																										
-	-	O																																										
-	X	-																																										
<table> <tr><td>-</td><td>O</td><td>X</td></tr> <tr><td>X</td><td>-</td><td>-</td></tr> <tr><td>-</td><td>-</td><td>O</td></tr> </table>	-	O	X	X	-	-	-	-	O	OF ORIGINAL	<table> <tr><td>-</td><td>X</td><td>-</td></tr> <tr><td>-</td><td>-</td><td>O</td></tr> <tr><td>O</td><td>-</td><td>X</td></tr> </table>	-	X	-	-	-	O	O	-	X	OF 90°	<table> <tr><td>O</td><td>-</td><td>-</td></tr> <tr><td>-</td><td>-</td><td>X</td></tr> <tr><td>X</td><td>O</td><td>-</td></tr> </table>	O	-	-	-	-	X	X	O	-	OF 180°	<table> <tr><td>X</td><td>-</td><td>O</td></tr> <tr><td>O</td><td>-</td><td>-</td></tr> <tr><td>-</td><td>X</td><td>-</td></tr> </table>	X	-	O	O	-	-	-	X	-	OF 270°	MIRROR IMAGES
-	O	X																																										
X	-	-																																										
-	-	O																																										
-	X	-																																										
-	-	O																																										
O	-	X																																										
O	-	-																																										
-	-	X																																										
X	O	-																																										
X	-	O																																										
O	-	-																																										
-	X	-																																										

Figure 4: Rotations and Mirror Images

sents a game where no one has moved. The machine can play an O in any of the nine squares:

```

O-----
-O-----
--O-----
---O-----
----O-----
-----O---
-----O--
-----O-
-----O

```

The O-----X configuration represents a machine's first move in the upper left-hand corner and the human's response with an X in the lower right-hand corner. The machine can now play in any of seven positions:

```

OO-----X
O-O-----X
O--O-----X
O---O-----X
O----O-----X
O-----O-X
O-----OX

```

The OO-----XX configuration represents two moves by the machine and two matching moves by the human. The machine can now play in any of the five remaining positions.

The OO-O-X-XX configuration represents three moves by the machine and three matching moves by the human. The machine can now play in any of the three remaining positions.

The OOOO-XXXX configuration represents four moves by the machine and four matching moves by the human. The machine can now play in one remaining position.

From these examples, you can see the relationship between the move number, the number of X's and O's already played, and the number of positions in which the machine can play:

Move	# of O's (machine)	# of X's (human)	Remaining positions
1	0	0	9
3	1	1	7
5	2	2	5
7	3	3	3
9	4	4	1

Selecting the Next Move

The next move in Michie's MENACE was made by shaking up the matchbox and choosing a colored head at random. Michie started out with four beads of nine colors for the first move matchboxes, three beads of each color for the third move matchboxes, two beads of each color for the fifth move matchboxes, and one bead of each color for the seventh move matchboxes (the ninth move has only one possibility). We can't use colored beads in the computer, but we can use a byte for each possible position and put a count in the byte. We'll use counts of five, four, three, two and one to simplify the ninth move processing. The count represents the number of colored beads. As an example, the configuration OO--X-X-- is a fifth move configuration with five possible next moves by the machine. We'll put three beads in our figurative matchbox for each of the five possible moves: OO--X-X-- 0,0,3,3,0,3,0,3,3.

The impossible moves (those already occupied by an X or O) are initialized with a count of 0. Possible moves are initialized with a count of 3.

The next move can be selected at random by adding up all of the counts ($3 + 3 + 3 + 3 + 3 = 15$) and then generating a random number from 1 to 15. Suppose the number generated was eight. The machine would accumulate counts from left to right and stop when the total was equal to eight. Since eight occurs here in the third count (tic-tac-toe square 6), the machine would use square 6 as its next move: OO--XOX--. The human might reply with square 9: OO--XOX-X.

At this point we're into a seventh move configuration of OO--XOX-X. The machine would look at that configuration, which was initialized to two counts for each position: OO--XOX-X 0,0,2,2,0,0,0,2,0.

The machine would add up the counts ($2 + 2 + 2 = 6$) and select a random number between 1 and 6, say 5. The number 5 is in the eighth position, so the machine would respond with: OO--XOXOX.

Play would continue until someone won the game or a draw occurred.

If the game was won by the machine, an adjustment would be made to the active configurations by adding three counts to each position. For the fifth move above this would change OO--X-X-- 0,0,3,3,0,3,0,3,3 to OO--XX-X-- 0,0,3,3,0,6,0,3,3.

For the seventh move OO--XOX-X 0,0,2,2,0,0,0,2,0 would become OO--XOX-X 0,0,2,2,0,0,0,5,0.

Similar adjustments would be made for draws (one would be added) and losses (one would be subtracted). The whole process would emulate "reward and punishment" used for training pets (and unruly kids) and should make the machine choose the path with the most counts.

Recording the Counts

We need a character string of nine bytes (characters) to record the configuration and nine additional bytes to hold counts — a total of 18 bytes. Since there are 3,139 possible

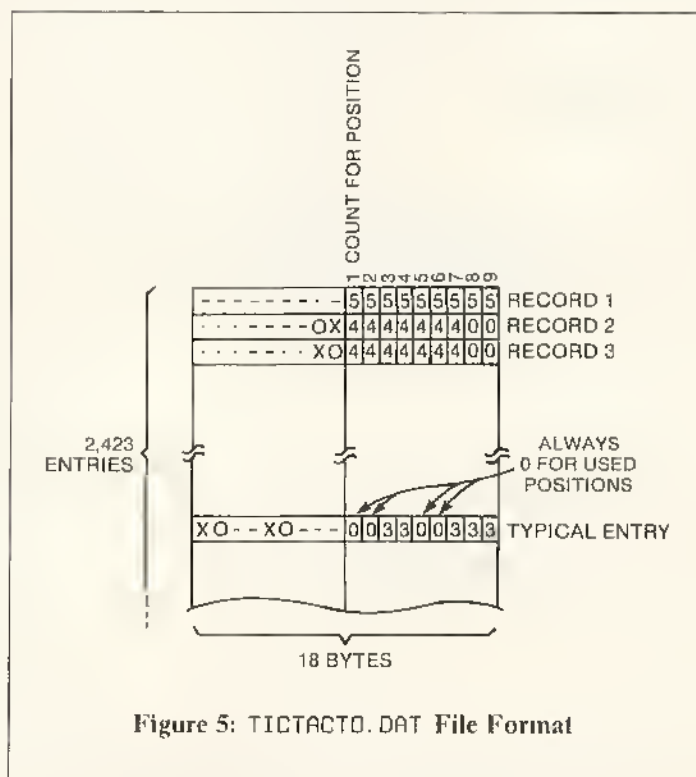


Figure 5: TICTACTO.DAT File Format

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configurations, that's $3,139 \times 18 = 56,502$ bytes, too large for normal BASIC memory. One solution is to hold configuration and counts in a disk file.

Since we're holding binary data in the counts (counts may range from 0 to 255) the file should be a *random* file. Sequential files are somewhat sensitive to odd values in bytes, such as values less than 32. Random files allow us to hold any value without problems.

The random file we'll use looks like Figure 5. Each record in the file has 18 bytes. The first nine bytes hold the configuration, a string of dashes, O's, and X's. The next nine bytes are nine fields, each field containing a count of 0 through 255. The file is generated by the program in Listing 3, a variation of the program in Listing 2. The new program initializes the master tic-tac-toe file and is used only once.

The program in Listing 3 also eliminates "end game" conditions, such as:

```
X X X
- O -
O - O
```

These end game conditions are not valid configurations because they would be detected before the machine had to make the next move. There are 18 end game conditions, three rows filled, three columns filled, and two diagonals filled for either O's (machine) or X's (human). Eliminating the end game configurations brings the total number of configurations down to 2,423 and the file of configurations down to 43,614 bytes.

The TICTACTO.DAT file is used by the processing program (described shortly) to find the current tic-tac-toe configuration and to look at the possible responses the machine can make. The program in Listing 3 also generates another file, called TTDIR.DAT. This file is a sequential file, as shown in Figure 6. TTDIR.DAT lists the record number in the TICTACTO.DAT file for any tic-tac-toe configuration. The catch is that a tic-tac-toe configuration such as -X--O-X-O must first be converted to a ternary number (in this example 4,474).

The TTDIR.DAT file is read into memory and scanned to find the current tic-tac-toe configuration; the index of the TTDIR.DAT entry (how far down the directory the entry is located) is identical to the number of the record in the TICTACTO.DAT file.

After running the program of Listing 3, therefore, you'll have two files on disk: the TICTACTO.DAT main working file, and the TTDIR.DAT directory file. Both are used by the TICTACTO.BAS program.

The TICTACTO.BAS Program

This program draws the tic-tac-toe diagram, checks for an end condition, and "rewards" or "punishes" the tic-tac-toe data so that the program learns. The program contains no intelligence to make it smart — it just accumulates data for the learning process. The program is shown in Listing 4.

Reading in the TTDIR.DAT File

The first thing the program does is to read in the TTDIR.DAT file into Array D. This file contains all 2,423 possible configurations of the tic-tac-toe matrix, in base 3 representation to save space. The program scans this array to find the current configuration and then uses the index value (1 through 2,423) as the record number of the TICTACTO.DAT record containing the counts and valid moves

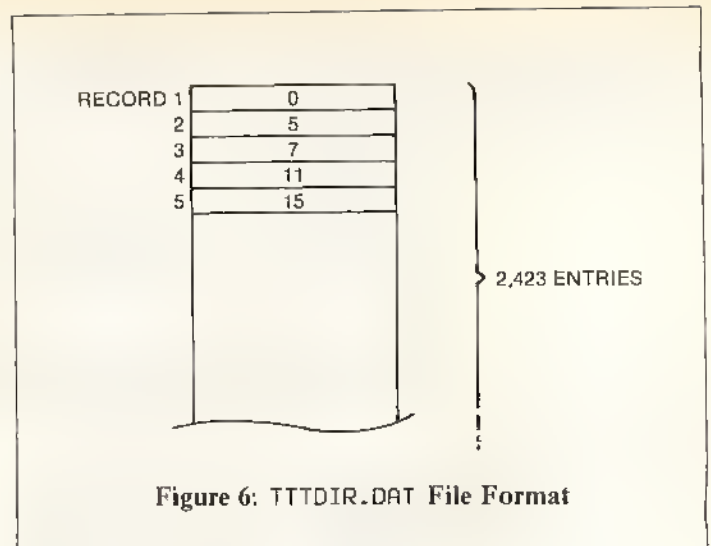


Figure 6: TTDIR.DAT File Format

for the machine to make. Reading in the TTDIR.DAT file takes a minute or so but only has to be done once for any number of games you want to play.

Screen Display

The screen display for TICTACTO.BAS is not very elegant. It is designed to run on 32-character wide text displays and looks like this:

```
1 2 3
4 5 6
7 8 9
- - -
O - -
- - -
YOUR MOVE: ?
```

General Operation

Note that as soon as the program starts running, the machine makes the first move. For every move made, the program looks at the current configuration, converts it to a base number, looks up the number in the D array, and then uses the index of the D array entry to read in the record from the TICTACTO.DAT file.

Once the record is read in, the counts are totaled. A random number is then generated, and a selection of the position is made to determine where the machine will play an O. The machine then makes the play.

After the machine has played, a test for done is made. This checks the rows, columns and diagonals for a machine win or a draw. The human cannot win at this point because the last human move was checked for a done condition directly after the move. By the way, draws can only occur after the machine has played.

If the machine has not won, a prompt message for the human's move is displayed. The human can play in any blank square; a check is made for a valid square. After the play has been made, a check for done is performed. If the human has not won, a loop is made back to the machine's play.

Reward and Punishment

Each time the machine plays, a record is made of the TICTACTO.DAT entry number and the position in which the response was made. (This corresponds to opening the box in Michie's MENACE.) At the end of the game, each TICTACTO.DAT entry is adjusted by adding or subtracting

counts from the entry position. Three is added for a win, one is added for a draw, and one is subtracted for a loss. The updated entries for TICTACTO.DAT are written back out to disk, so that the TICTACTO.DAT always reflects the accumulated knowledge of the machine.

A history file is also updated at the end of the game. This file is another random file with records one byte long. For each game, a new letter is added to the end of the file — either W, D or L.

Variables

As mentioned above, D holds the base 3 configurations. It's a numeric array of 2,423 entries and takes up about 12,115 bytes.

Arrays R and F hold the record number and position number for play for each machine move. These arrays are used to update the TICTACTO.DAT file after each game. Array A\$ is the actual tic-tac-toe matrix itself. Each of its nine entries corresponds to one of the nine tic-tac-toe positions. Each entry holds either a dash, X or O. Array BD is the numeric form of the array. It's used to make the conversion from a string configuration to a base three numeric configuration easier.

Subroutines

The program is divided into subroutines to make the processing more modular and easier to decode.

The Display O or X subroutine uses the variable I to indicate the position on the tic-tac-toe matrix of 1 through 9. The tic-tac-toe matrix uses three lines starting at screen positions 207, 239, and 271. One blank is used between positions. The one character in string variable Y\$ (O or X) is printed at the line start plus a displacement based upon the position number.

The Test for Done subroutine builds up a string called X\$, composed of the three characters from an A\$ row, column, or diagonal. Another subroutine is then called to test for either an XXX or OOO string. The main subroutine also tests for all positions filled. If a draw results (nine positions filled), the variable DN is set to 1. If the machine has won, DN is set to 3; if the human has won, DN is set to -1. If there is no done condition, DN is set to 0. Note that DN holds the reward or punishment count to be added or subtracted from the count in the TICTACTO.DAT entries.

The next machine move subroutine first converts the tic-tac-toe configuration into a base 3 number. Array D is then searched for this number. The number *must* be found, as

Array D holds all possible configurations. When found, the index to Array D is equivalent to the record number of the TICTACTO.DAT entry. A GET reads this record. A random selection is then made of the machine's play. The Display X subroutine is called to display the play, and the A\$ array is changed to reflect the play. An entry is also made in the R array for the record number and the F array for the position number of the play.

The reward/punishment subroutine looks at Array R to find each record of TICTACTO.DAT that has been used in the play. Each of these records is read in, and the count in the proper position (obtained from Array F) is adjusted by the value in the variable DN. The record is then rewritten to disk.

A single-character record is then added to the history file to reflect the results of the game.

How Would You Like to Be a Teacher?

With some slight modifications, it would be possible to make the program play against itself (just generate a random number of 1 through 9 in place of the user input). The machine would then go along and play continuous game after continuous game, presumably getting smarter all the time.

For the purposes of this column, though, I thought it might be interesting if interested readers would play the hundreds or thousands of games required to make the program learn. What I visualize is this:

Interested CoCo freaks can write me for a copy of the game and files. I will then send the game out in sequence so that each person can play as many games as he or she wishes — maybe a hundred or so each (about a half-hour's worth). The player can then send the updated disk back to me, and I'll send it on to the next person. After the machine learns how to play properly, I'll send a copy of the updated files back to each person, so he or she can see how smart the program has become. I'll also plot the learning statistics in a column, together with the names of each person who participated. For this project to work, we must send the master disk by at least first class mail. I visualize about a month's worth of time until we have a smart program. How about it? If you would like to participate in this experiment, send your name and address to me at:

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I'll add your name to the list and we can get this interesting project going.

See you next month with more CoCo topics. □

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Listing 1: ALLPERMS

```

100 ' PRINTS ALL PERMUTATIONS OF
    TIC-TAC-TOE, EVEN IMPOSSIBLE ON
    ES
110 DIM A$( 9 )
120 C = 0
130 FOR I = 1 TO 9: A$( I ) = "-"
    ": NEXT
140 C = C + 1
150 FOR I = 1 TO 9: PRINT A$( I
    );: NEXT: PRINT C
160 I = 9
170 IF A$( I ) = "-" THEN A$( I
    ) = "O": GOTO 180 ELSE IF A$( I
    ) = "O" THEN A$( I ) = "X
    ": GOTO 180 ELSE A$( I ) = "-":
    IF I <> 1 THEN I = I - 1: GOTO
        170 ELSE GOTO 190
180 GOTO 140
190 STOP

```

Listing 2: 1STMOVES

```

100 ' PRINTS ALL POSSIBLE PERMUT
    ATIONS OF TIC-TAC-TOE FOR MACHIN

```

```

E FIRST MOVE
110 DIM A$( 9 )
120 C = 0: PC = 0
130 FOR I = 1 TO 9: A$( I ) = "-"
    ": NEXT
140 C = C + 1
150 BC = 0: OC = 0: XC = 0
160 FOR I = 1 TO 9: IF A$( I ) =
    "-" THEN BC = BC + 1 ELSE IF A$
    ( I ) = "O" THEN OC = OC
    + 1 ELSE XC = XC + 1
170 NEXT
180 IF OC = XC THEN PRINT A$( 1
    ); A$( 2 ); A$( 3 ); A$( 4 ); A$
    ( 5 ); A$( 6 ); A$( 7 ); A$(
    8 ); A$( 9 ); C: PC = PC + 1
190 I = 9
200 IF A$( I ) = "-" THEN A$( I
    ) = "O": GOTO 210 ELSE IF A$( I
    ) = "O" THEN A$( I ) = "X
    ": GOTO 210 ELSE A$( I ) = "-":
    IF I <> 1 THEN I = I - 1: GOTO
        200 ELSE GOTO 220
210 GOTO 140
220 PRINT PC

```

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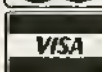
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	390192
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Listing 3: DATAMAKR

```

100 ' INITIALIZES "TICTACTO" WORK
    KING FILE FOR PLAY
110 CLS
120 PRINT "INITIALIZE TICTACTO"
130 OPEN "D", #1, "TICTACTO", 18
140 OPEN "O", #2, "TTTDIR"
150 FIELD #1, 9 AS X$, 1 AS B$,
    1 AS C$, 1 AS D$, 1 AS E$, 1 AS
    F$, 1 AS G$, 1 AS H$, 1 AS
    I$, 1 AS J$
160 DIM A$( 9 )
170 C = -1: PC = 1
180 FOR I = 1 TO 9: A$( I ) = "-
    ": NEXT
190 BC = 0: OC = 0: XC = 0
200 C = C + 1
210 FOR I = 1 TO 9: IF A$( I ) =
    "-" THEN BC = BC + 1 ELSE IF A$

```

```

( I ) = "O" THEN OC = OC
+ 1 ELSE XC = XC + 1
220 NEXT
230 IF OC <> XC THEN GOTO 450
240 IF OC < 3 THEN GOTO 260
250 GOSUB 530: IF DN <> 0 THEN G
    OTO 450
260 IF OC = 0 THEN MN = 5 ELSE I
    F OC = 1 THEN MN = 4 ELSE IF OC
    = 2 THEN MN = 3 ELSE IF OC =
    3 THEN MN = 2 ELSE MN = 1
270 LSET B$ = CHR$( 0 ): LSET C$
    = CHR$( 0 ): LSET D$ = CHR$( 0
    ): LSET E$ = CHR$( 0 ): L
    SET F$ = CHR$( 0 ): LSET G$ = CH
    R$( 0 ): LSET H$ = CHR$( 0 ):
    LSET I$ = CHR$( 0 ): LSET J$
    = CHR$( 0 )
280 FOR I = 1 TO 9
290 IF I = 1 THEN IF A$( 1 ) = "
    -" THEN LSET B$ = CHR$( MN )
300 IF I = 2 THEN IF A$( 2 ) = "
    -" THEN LSET C$ = CHR$( MN )
310 IF I = 3 THEN IF A$( 3 ) = "
    -" THEN LSET D$ = CHR$( MN )
320 IF I = 4 THEN IF A$( 4 ) = "
    -" THEN LSET E$ = CHR$( MN )

```

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```

330 IF I = 5 THEN IF A$( 5 ) = "
  -" THEN LSET F$ = CHR$( MN )
340 IF I = 6 THEN IF A$( 6 ) = "
  -" THEN LSET G$ = CHR$( MN )
350 IF I = 7 THEN IF A$( 7 ) = "
  -" THEN LSET H$ = CHR$( MN )
360 IF I = 8 THEN IF A$( 8 ) = "
  -" THEN LSET I$ = CHR$( MN )
370 IF I = 9 THEN IF A$( 9 ) = "
  -" THEN LSET J$ = CHR$( MN )
380 NEXT I
390 Y$ = A$( 1 ) + A$( 2 ) + A$(
  3 ) + A$( 4 ) + A$( 5 ) + A$( 6
  ) + A$( 7 ) + A$( 8 ) + A$(
  9 )
400 LSET X$ = Y$
410 PUT#1, PC
420 PRINT#2, C
430 PC = PC + 1
440 PRINT ".";
450 I = 9
460 IF A$( I ) = "-" THEN A$( I
  ) = "O": GOTO 470 ELSE IF A$( I
  ) = "O" THEN A$( I ) = "X
  ": GOTO 470 ELSE A$( I ) = "-":
  IF I <> 1 THEN I = I - 1: GOTO
    460 ELSE GOTO 480
470 GOTO 190
480 CLOSE
490 PRINT "TICTACTO INITIALIZED"
500 PRINT "COUNT="; PC - 1
510 END
520 '=====
=====
530 ' TEST FOR DONE SUBROUTINE
540 CT = 0
550 FOR I = 1 TO 9
560 IF A$( I ) <> "-" THEN CT =
  CT + 1
570 NEXT
580 IF CT = 9 THEN DN = 1: GOTO
  740
590 Z$ = A$( 1 ) + A$( 2 ) + A$(
  3 ): GOSUB 760
600 IF DN <> 0 THEN GOTO 740
610 Z$ = A$( 4 ) + A$( 5 ) + A$(
  6 ): GOSUB 760
620 IF DN <> 0 THEN GOTO 740
630 Z$ = A$( 7 ) + A$( 8 ) + A$(
  9 ): GOSUB 760
640 IF DN <> 0 THEN GOTO 740
650 Z$ = A$( 1 ) + A$( 4 ) + A$(
  7 ): GOSUB 760
660 IF DN <> 0 THEN GOTO 740
670 Z$ = A$( 2 ) + A$( 5 ) + A$(
  8 ): GOSUB 760
680 IF DN <> 0 THEN GOTO 740
690 Z$ = A$( 3 ) + A$( 6 ) + A$(
  9 ): GOSUB 760
700 IF DN <> 0 THEN GOTO 740

```

```

710 Z$ = A$( 7 ) + A$( 5 ) + A$(
  3 ): GOSUB 760
720 IF DN <> 0 THEN GOTO 740
730 Z$ = A$( 1 ) + A$( 5 ) + A$(
  9 ): GOSUB 760
740 RETURN
750 '-----
760 ' EVALUATE
770 IF Z$ = "XXX" THEN DN = -1:
  GOTO 800
780 IF Z$ = "OOO" THEN DN = 3: G
  OTO 800
790 DN = 0
800 RETURN

```

✓	310	.....23	1050	.....127
	480	.....134	1220	.....39
	680	.....77	END	.....62
	830	.....104		

Listing 4: TICTACTO

```

100 ' TIC-TAC-TOE DRIVER PROGRAM
110 '=====
=====
120 CLS
130 PRINT "READING DIRECTORY"
140 DIM D( 2423 ), R( 5 ), F( 5
  ), A$( 9 ), BD( 9 )
150 '-----
160 OPEN "I", #1, "TTTDIR.DAT"
170 FOR I = 1 TO 2423
180 INPUT#1, D( I )
190 PRINT ".";
200 NEXT I
210 CLOSE 1
220 CLS
230 PRINT "DIRECTORY IN MEMORY"
240 '-----
250 OPEN "D", #2, "TICTACTO.DAT"
  ,18
260 FIELD#2, 9 AS B$, 1 AS C$, 1
  AS D$, 1 AS E$, 1 AS F$, 1 AS G
  $, 1 AS H$, 1 AS I$, 1 A
  S J$, 1 AS K$
270 '=====
=====
280 FOR I = 1 TO 300: NEXT
290 CLS
300 FOR I = 1 TO 9: A$( I ) = "-
  ": NEXT
310 FOR I = 1 TO 5: R( I ) = -1:
  NEXT
320 RP = 1: FP = 1
330 CLS
340 PRINT "
  1 2 3"

```



```

350 PRINT "                                4 5 6"
360 PRINT "                                7 8 9"
370 PRINT: PRINT
380 PRINT@ 207, A$( 1 ); " "; A$(
( 2 ); " "; A$( 3 )
390 PRINT@ 239, A$( 4 ); " "; A$(
( 5 ); " "; A$( 6 )
400 PRINT@ 271, A$( 7 ); " "; A$(
8 ); " "; A$( 9 )
410 ' GET MACHINE'S MOVE AND TES
T FOR DONE
420 GOSUB 580
430 GOSUB 830
440 IF DN <> 0 THEN PRINT@ 320,
"
450 IF DN = 3 THEN PRINT@ 320, "
I WIN": GOSUB 1190: GOTO 280
460 IF DN = 1 THEN PRINT@ 320, "
DRAW": GOSUB 1190: GOSUB 280
470 PRINT@ 320, "
";
480 ' GET HUMAN'S MOVE AND TEST
FOR DONE
490 PRINT @320, "YOUR MOVE:": I
NPUT I
500 IF A$( I ) <> "-" THEN GOTO
470
510 A$( I ) = "X"
520 Y$ = "X": GOSUB 1130
530 GOSUB 830
540 IF DN <> 0 THEN PRINT@ 320,
"
"
550 IF DN = -1 THEN PRINT@ 320, "
YOU WIN!": GOSUB 1190: GOTO 280
560 GOTO 420
570 '=====
=====
=====
580 ' NEXT MACHINE MOVE SUBROUTI
NE
590 TC = 0
600 FOR I = 1 TO 9
610 X$ = A$( I )
620 IF X$ = "X" THEN C = 2 ELSE
IF X$ = "O" THEN C = 1 ELSE C =
0
630 TC = TC * 3 + C
640 NEXT I
650 '-----
660 ' NOW HAVE BASE 3 CONFIGURAT
ION VALUE - FIND RECORD #
670 IF A$( 1 ) = "-" THEN K = 1
ELSE IF A$( 1 ) = "O" THEN K = 9
69 ELSE IF A$( 1 ) = "X
" THEN K = 1696
680 FOR I = K TO 2423: IF D( I )
= TC THEN GOTO 690 ELSE NEXT
690 GET#2, I: R( RP ) = I: RP =
RP + 1
700 BD( 1 ) = ASC( C$ ): BD( 2 )
= ASC( D$ ): BD( 3 ) = ASC( E$

```

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```

): BD( 4 ) =          ASC( F$ ): B
D( 5 ) = ASC( G$ ): BD( 6 ) = AS
C( H$ ): BD( 7 ) = ASC( I$ ):
      BD( 8 ) = ASC( J$ ): BD( 9 )
      = ASC( K$ )
710 CT = 0
720 FOR I = 1 TO 9: CT = CT + BD
( I ): NEXT
730 C = RND( CT )
740 CT = 0
750 FOR I = 1 TO 9
760 CT = CT + BD( I ): IF CT >=
C THEN GOTO 780
770 NEXT
780 F( FP ) = I: FP = FP + 1
790 A$( I ) = "O"
800 Y$ = "O": GOSUB 1130
810 RETURN
820 '=====
=====
830 ' TEST FOR DONE SUBROUTINE
840 X$ = A$( 1 ) + A$( 2 ) + A$(
3 ): GOSUB 1070
850 IF DN <> 0 THEN GOTO 1050
860 X$ = A$( 4 ) + A$( 5 ) + A$(
6 ): GOSUB 1070
870 IF DN <> 0 THEN GOTO 1050
880 X$ = A$( 7 ) + A$( 8 ) + A$(
9 ): GOSUB 1070
890 IF DN <> 0 THEN GOTO 1050
900 X$ = A$( 1 ) + A$( 4 ) + A$(
7 ): GOSUB 1070
910 IF DN <> 0 THEN GOTO 1050
920 X$ = A$( 2 ) + A$( 5 ) + A$(
8 ): GOSUB 1070
930 IF DN <> 0 THEN GOTO 1050
940 X$ = A$( 3 ) + A$( 6 ) + A$(
9 ): GOSUB 1070
950 IF DN <> 0 THEN GOTO 1050
960 X$ = A$( 7 ) + A$( 5 ) + A$(
3 ): GOSUB 1070
970 IF DN <> 0 THEN GOTO 1050
980 X$ = A$( 1 ) + A$( 5 ) + A$(
9 ): GOSUB 1070
990 IF DN <> 0 THEN GOTO 1050
1000 CT = 0
1010 FOR I = 1 TO 9
1020 IF A$( I ) <> "-" THEN CT =
CT + 1
1030 NEXT
1040 IF CT = 9 THEN DN = 1
1050 RETURN
1060 '-----
1070 ' EVALUATE
1080 IF X$ = "XXX" THEN DN = -1:
GOTO 1110
1090 IF X$ = "OOO" THEN DN = 3:
GOTO 1110
1100 DN = 0
1110 RETURN

```



```

1120 '=====
=====
1130 ' DISPLAY O OR X ON SCREEN
IN PROPER POSITION
1140 IF I < 4 THEN PRINT@207 + (
I - 1 ) * 2, Y$; GOTO 1170
1150 IF I < 7 THEN PRINT@239 + (
I - 4 ) * 2, Y$; GOTO 1170
1160 PRINT@ 271 + ( I - 7 ) * 2,
Y$;
1170 RETURN
1180 '=====
=====
1190 ' REWARD/PUNISHMENT AND HIS
TORY FILE
1200 FOR I = 1 TO 5
1210 IF R( I ) = -1 THEN 1320 EL
SE GET#2, R( I )
1220 BD( 1 ) = ASC( C$ ): BD( 2
) = ASC( D$ ): BD( 3 ) = ASC( E$
): BD( 4 ) = ASC( F$ ):
BD( 5 ) = ASC( G$ ): BD( 6 ) = A
SC( H$ ): BD( 7 ) = ASC( I$ ):
BD( 8 ) = ASC( J$ ): BD( 9
) = ASC( K$ )
1230 BD( F( I ) ) = BD( F( I ) )
+ DN

```

```

1240 IF BD( F( I ) ) < 1 THEN BD
( F( I ) ) = 1
1250 IF BD( F( I ) ) > 255 THEN
BD( F( I ) ) = 255
1260 LSET C$ = CHR$( BD( 1 ) ):
LSET D$ = CHR$( BD( 2 ) ): LSET
E$ = CHR$( BD( 3
) )
1270 LSET F$ = CHR$( BD( 4 ) ):
LSET G$ = CHR$( BD( 5 ) ): LSET
H$ = CHR$( BD( 6
) )
1280 LSET I$ = CHR$( BD( 7 ) ):
LSET J$ = CHR$( BD( 8 ) ): LSET
K$ = CHR$( BD( 9
) )
1290 PUT#2, R( I )
1300 NEXT
1310 '-----
1320 OPEN "D", #1, "HISTORY", 1
1330 FIELD#1, 1 AS U$
1340 IF DN = 3 THEN V$ = "W" ELS
E IF DN = 1 THEN V$ = "D" ELSE V
$ = "L"
1350 LSET U$ = V$
1360 R = LOF( 1 ): PUT#1, R + 1
1370 CLOSE 1
1380 RETURN

```

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Sending the Right Signals

By Dale L. Puckett
Rainbow Contributing Editor

Our project to write a "shell" program that will give you a starting point for all of your BASIC09 application programs is progressing like the infamous race between the tortoise and the hare. I feel like the tortoise. The hare's ahead at this point, but I'm inehing up on him.

Last month, we began the MVShell project with the code needed to create a window on your Color Computer 3. That window had a frame around the edge and a menu bar on top. The menu bar displayed only one menu title, the Tandy hourglass icon, which gives you access to the desk accessories that Tandy includes in the *Multi-View* package. This month we add to the initial window effort and enter the fascinating world of OS-9 signals. You'll want to follow the two tutorial programs *SigTestOne* and *SigTestTwo* closely. They contain a kernel of information you'll need to really start understanding multitasking, background processing and other OS-9 magic.

Dale L. Puckett, a freelance writer and programmer, serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. His username on Delphi is DALEP; on packet-radio, K0HYD @ N4QQ; on GENie, D.PUCKETT2; and on CIS, 71446,736.

After this month's additions, MVShell will display the same window. However, you'll now see the titles for the standard Files and Edit menu. We emphasize standard here, because that's really the point behind the MVShell project. If we all write our OS-9 *Multi-View* application programs in the same manner, using the same set of menus, etc., we will soon defeat the OS-9 learning curve.

After you have learned how to run one program, you will know how to run them all. Only the internal details of the problem your program solves will be different. For example, after the standard is in place you will be able to save the words you've typed with your new word processor using the same menu or keystrokes you used to save your *KISS-Draw* art. You'll start your spelling checker the same way you start your word processor. You'll open files, create files, save files and delete files in the same manner — no matter what program you're running.

My sources tell me that a meeting of CoCo OS-9 gurus is planned — cross your fingers and read this as "was held" — at RAINBOWfest Chicago to set the standard for the *Multi-View* clipboard. After this standard is defined and developers start using it, you'll be able to mark objects — or a number of characters if you're using a word proc-

essor — and copy them to the clipboard. Once they are in the clipboard, you will be able to paste them back at another location in your drawing or story.

If the standard is broad enough, maybe you'll be able to copy a couple of objects from your drawing program and then paste them into your word processor. People are doing it every day on a number of computers. Defining standards and using them will let us do the same things on the Color Computer. These are indeed exciting times.

If standardization doesn't turn you on, you'll find many additional benefits in an MVShell-type program! For example, once you have MVShell, you will never need to write code to take care of a program's housekeeping functions again — MVShell will create windows, handle menus, track the mouse, open files, save files, etc., for you. All you will need to do is write the functional code that takes care of the tasks unique to your application program.

Additionally, if you use the code we're developing in MVShell, you will always have the standard Tandy desk accessory programs available for use from within your own BASIC09 *Multi-View* applications. In fact, you could take this lead one step further and add a number of your own desk accessories under the Tandy menu. Or, you could remove the Tandy desk accessories you

Listing 1: MVShell

```

PROCEDURE MVShell
$999 (* MVShell -- The beginning of an adventure in Multi-Vue
$938 (*
$93B (* You'll need this code in each Basic99 Application program
$977 (* you write for Multi-Vue.
$992 (*
$995 (* First, we create Basic99 Type statements
$999 (* that emulate the C header files presented in the Multi-Vue
$9FD (* documentation and supplied as part of the Tandy Program
$137 (* Developers package. A quick SysCall routine
$166 (* at the end lets you see that your definitions
$197 (* actually work. We've added the File and Edit menus
$1CD (* and will show you how to add your own menus. We'll also be showing
$213 (* you how to set up a mouse routine that runs in the background
$253 (* and sends signals to your application when the user clicks the
$294 (* mouse button. When we finish this "Shell" or "skeleton"
$2CF (* application, all you'll need will be your own application
$39C (* code.
$314 (*
$317 (* First, we must define the variables we will use in every
$352 (* Multi-Vue based program. These definitions use the same
$38D (* names as the C header files that come with the Developers
$3CA (* Pak. Our first group of definitions is an emulation of the
$499 (* Wind.K file.
$418 (*
$419 (* General definitions
$42F DIM Null, CallCode, FunCode: BYTE
$43E DIM StdIn, StdOut: BYTE
$449 DIM EndStr: STRING[1]
$455 Null:=0
$45G EndStr:=CHR$(Null)
$465 StdOut:=1 \StdIn:=0
$473
$474
$475 (* Define 6809 registers so we can use the get
$4A3 (* and set status calls with syscall
$4C7
$4CB TYPE Registers=cc,e,b,dp: BYTE; x,y,u: INTEGER
$4ED DIM Regs: Registers
$4F6
$4F7 (* Window type defs. They tell the WindInt code within OS-9
$533 (* what type of box you want to create on the screen.
$568 DIM WT_NBox, WT_FWin, WT_FSWin, WT_SBox, WT_DBox, WT_PBox: INTEGER
$583 WT_NBox:=0 \WT_FWin:=1 \WT_FSWin:=2
$598 WT_SBox:=3 \WT_DBox:=4 \WT_PBox:=5
$5AE
$5AF DIM MNEmb1, MNDsbl: BYTE \(* MV talk for Enable and MNDsbl
$5DA MNEmb1:=1 \MNDsbl:=Null
$5E9
$5EA DIM WINSync: INTEGER
$5F1 WINSync:=0
$5F9
$5FA DIM MN_Move, MN_Glos, MN_Grow, MN_Uscr1, MN_Dscr1, MN_Rscr1, MN_Lscr1
: BYTE
$619 DIM MN_Tndy, MN_File, MN_Edit, MN_Styl, MN_Font, MN_Char: BYTE
$634 MN_Move:=1 \MN_Glos:=2 \MN_Grow:=3 \MN_Uscr1:=4
$659 MN_Dscr1:=5 \MN_Rscr1:=6 \MN_Lscr1:=7
$665 MN_Tndy:=8 \MN_File:=21 \MN_Edit:=22
$67A MN_Styl:=23 \MN_Font:=24 \MN_Char:=8
$68F
$699 (* Here are some more definitions you'll need in almost all of your
$6D3 (* Basic99 / Multi-Vue application programs. This group takes care
$716 (* of the many buffers used within OS-9 Level II.

```

never use and substitute your own. The ability to instantly run a desk accessory program from a program of your own will immediately improve the quality of your life at the Color Computer keyboard.

If you haven't gotten around to entering MVShell from the June issue of RAINBOW, feel free to skip that version and dig right into this month's code. Everything that was presented last month is included here. If you're just joining our MVShell series, you'll notice that we used the same variable names in this program that Tandy uses in its assembly language and C Defs files. We hope this will help keep the terminology standard across all languages and make it easier for BASIC99 programmers to communicate with the assembly language and C gurus.

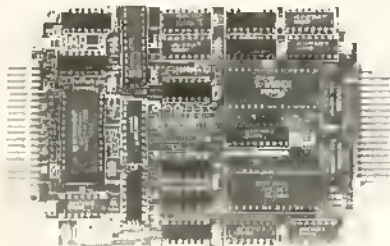
Because BASIC99 does not have built-in Define statements like C and PASCAL, we had to improvise. Essentially, we just used a variable to hold our definitions. However, you must note one important point here. Before we defined or initialized any variable to a preset value, we used BASIC99's TYPE and DIM statements to ensure that the data held by our variables was exactly the same shape as that used by assembly language and C and PASCAL programmers.

This data typing is extremely important here because before we have completed MVShell we will have added dozens of SysCalls throughout the program. SysCall passes data directly to the internals of OS-9. If you pass OS-9 an integer when it expects and only has room for a byte, it will most likely choke. Your program will crash.

Hey, Joe! Send me a "Signal"!

While the theory behind an idea may be simple, implementing that same idea

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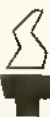
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is often a different story. That's the situation we ran into with MVShell. We started with the desire to emulate the assembly language or C "intercept" function in a BASIC09 program. Before we were through, we had tested two completely different approaches. I hope our examples will encourage you to experiment and give you a few ideas about how you can find out what is actually going on inside your program. First, however, let's review a few of the things we learned during the *KISSDraw* series.

In the November column you were introduced to the concept of event-oriented programming — a concept that has given birth to a new generation of productive computer users. Before event-oriented programming hit the Coast, the computer dictated the flow of a program. Today, you control the flow.

When you click the mouse button on your Color Computer, you generate an event. The flow of the program after you push that button depends on the type of event you initiated. Remember the main event loop that forms the heart of every Macintosh application program. Take another look at the English language code below. We're going to give you the basics you'll need to create the same main event loop with a BASIC09 program. Next month, we hope to put one together for you.

REPEAT

Get an event from the event queue
Determine what type of event it is
Respond to the event if appropriate
UNTIL the application is terminated

We used this model when we wrote the main loop for *KISSDraw*. Our "do forever" loop continuously polled the mouse with a "get status" call. When the button was pushed, we determined where the mouse was located. This position dictated the action the program would need to take. If the mouse pointer was in the toolbox, we then determined the tool and let you use it to draw an object on the screen. When you finished with the tool, our program continued to circulate through the main event loop until you pushed the button again.

Multi-View programs use a similar strategy. However, there's a big difference between them and the *KISSDraw* model. *Multi-View* programs use signals sent by the mouse to determine when and where they need to do something.

```

0747
0748 DIM Grp_Font,Grp_Clip,Grp_Pcr,Grp_Pat2,Grp_Pat4,Grp_Pat6:BYTE
0763 DIM Fnt_S8x8,Fnt_S6x8,Fnt_G8x8:BYTE
0772 DIM Pcr_Arr,Pcr_Pen,Pcr_Lch,Pcr_Slp,Pcr_Ill,Pcr Txt,Pcr_Sch

:BYTE
0791 DIM WR_Cntrl,WR_Cntrl,WR_OfWin:BYTE
07A0 DIM Fnt_Sld,Fnt_Dot,Fnt_Vrt,Fnt_Hrz,Fnt_Xhct,Fnt_Lant:BYTE
07BB DIM Fnt_Rsnt,Fnt_Sdot,Fnt_Sdot:BYTE
07CA
07CB
0810
0823
0824
0846 Grp_Font:=200
0848 Grp_Clip:=201
0854 Grp_Pcr:=202
085B Grp_Pat2:=203
0862 Grp_Pat4:=204
0869 Grp_Pat6:=205
0870
0871
0884 Fnt_S8x8:=1
088B Fnt_S6x8:=2
0892 Fnt_G8x8:=3
0899
089A
08B6 Pcr_Arr:=1
08BD Pcr_Pen:=2
08C4 Pcr_Lch:=3
08C8 Pcr_Slp:=4
08D2 Pcr_Ill:=5
08D9 Pcr Txt:=6
08E0 Pcr_Sch:=7
08E7
08E8
0908 WR_Cntrl:=0
0912 WR_Cntrl:=1
0919 WR_OfWin:=2
0920
0921
0937 Fnt_Sld:=0
093E Fnt_Dot:=1
0945 Fnt_Vrt:=2
094C Fnt_Hrz:=3
0953 Fnt_Xhct:=4
095A Fnt_Lant:=5
0961 Fnt_Rsnt:=6
0968 Fnt_Sdot:=7
096F Fnt_Sdot:=8
0976
0977
09C1
09C6
0A27
0A28 TYPE rodent=valid,actv,totm:BYTE; rsrcv:INTEGER; tcto:BYTE; tstat
:INTEGER; cbsa,cbab,ccta,ccab,ctsa,ctsb,ctsa,ctsb:BYTE
; rsrcv,bdx,bdy:INTEGER; stat,res:BYTE; acx,acy,wrx,wry
:INTEGER
0A99
0A9A DIM msret:rodent
0AA3
0AA4
0AB0
0AB9
0AB9
0B10
0B1F DIM sigcode,stat,wpad:INTEGER
0B20
0B40 wxmin:=40 \(* minimum screen width for our window
0B40 wxmin:=24 \(* minimum screen height
0B6C
0B6D _update:=3 \(* update rate for the mouse
0B90 timeout:=10 \(* timeout between clicks
0B90 follow:=1 \(* update cursor when mouse moves.
0B99 \(* set to zero for no follow
0BFA cur_wind:=0 \(* flag to fork a process on current window
0C2C
0C2D moussig:=10 \(* signal code returned by the mouse when
0C5D \(* the button is clicked and you need to check
0C8B \(* a pull down menu.
0C9F
0CAP miscsig:=15 \(* miscellaneous signal code
0CC3 wait:=20 \(* signal code to wait for button to be pressed
0CF9
0CFA
0D18 \(* Window menu data structures
0D18 \(* The first structure holds a menu item descriptor which includes:
0D5B \(* the name of the item, a byte to tell if the item is enabled or not,
0DA1 \(* and five reserved bytes.

```



```

9DB8 TYPE Mistr=_mnttl:STRING(15); _mienbl:BYTE; _mires(5):BYTE
9DBD DIM MidScr:Mistr
9DE7
9DE9 (* The next structure holds the definition of a menu. This includes:
9ED0 (* The name of the menu, the id number of the menu, the width of the
9E71 (* menu, the number of items in the menu and a byte that tells
9EB9 (* if the item is available or not. Two "reserved" bytes must be
9E91 (* inserted before the last field. Make this correction in your
9F31 (* Multi-Vue manual.
9F45 (* The final item in the structure is a pointer to the address of the
9FBA (* array of structures that hold the individual menu items.
9FC5
9FC6 TYPE mnstr=_mnttl:STRING(15); _mwid,_mwxalz,_mnmlta,_mnenabl

:BYTE; _reser2,_mnitems:INTEGER
9FF2 DIM MNDscr:mnstr
9FFB
9FFC (* The final structure defines the contents of an entire window.
103C (* This includes the title of the window, the number of menus on
107C (* the window, the minimum height of the window, the minimum
10B8 (* width of the window, a special pair of synch bytes and seven
10F7 (* reserved bytes. A pointer to an array of menus -- or data of
1137 (* the type "mnstr" -- which we just defined.
1164
1165 TYPE wnstr=_wnnttl:STRING(20); _wnmens,_wnmln,_wymlu:BYTE; _wnsync

:INTEGER; _wnres(7):BYTE; _wnmen:INTEGER
119A DIM WndScr:wnstr
11A3
11A4 (* After we define -- or "type" -- the special data structures
11E2 (* we need for a Multi-Vue based program, we must initialize
121E (* the data in these structures. We start with the items we
125A (* want to appear on our lone menu. Notice that we needed to
1298 (* add a "null" character or 00 hex at the end of each string.
12D6 (* We must do this because Basic99 uses $FF hex to define the
1313 (* end of its strings and Multi-Vue expects the "C" style
134D (* 00 hex for a delimiter.
1367
1368 DIM _canitms(9):Mistr
1376 _canitms(1)._mnttl:="Calc"+EndStr
1388 _canitms(1)._mieubl:="MNEubl
1399 _canitms(2)._mnttl:="Clock"+EndStr
13AF _canitms(2)._mienbl:="MNEubl

```

When the mouse button is up and their services aren't required, these programs can go about their business and do something else. They service the mouse only when you generate an event by pushing the mouse button.

This approach is extremely important in the *Multi-Vue* environment where you may have three or four different windows open with a different program running in each. Each program is sharing time with the others. Yet, picture what would happen if a program like *KISSDraw* were running in one of the windows. Since it runs in a tight loop that constantly reads the mouse, it would hog much of the 6809 microprocessor's time. Other programs running on the same Color Computer would appear sluggish at best. A real-world example of a program that hogs the microprocessor is the device driver for the bit banger port, /t1, on the rear panel of your Color Computer. When an OS-9 program is using this port, other processes barely function.

Now, compare this with the true "event-oriented" approach. In *MVShell* and many other programs designed to run in a multitasking environment, a process is put to sleep when it is not actively doing anything. It awakens

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only after receiving a signal from you or the hardware. While the process is asleep, other programs running on the same computer shine.

Most *Multi-View* programs emulate the technique shown in the Macintosh model above. Our *MVShell* will do the same. Our first versions of *MVShell* will deal with one event at a time; however, with a little help from our friends we may be able to show you how to set up and handle a queue of events later on.

The Easy Approach

This month we learned once again — and quickly — that the “easy” way is usually not the way to go. But at least it got us to thinking. Before we ran into the easy way, we had been stumped. Your mission, should you decide to accept it, is to emulate the model below, which forms the heart of most *Multi-View* applications written in C:

Create Window

Initialize and start mouse

Set Intercept trap

DO

Set signal code equal to zero

Tell the mouse which signal to send (when button is clicked)

Put process to sleep

Wake up and handle chores (after receiving a signal)

FOREVER

When you first gaze at the algorithm above, it looks like it should be a fairly simple task — and it is, in assembly language and C. However, the task becomes a little more complicated when you are using BASIC99; this language does not give you a way to set an intercept.

The brainstorm that resulted in our easy solution — *SigTestOne* — followed a telephone conversation with OS-9 Users Group *MOTD* editor, Bill Brady. Brady mentioned using BASIC99's ON ERROR GOTO statement to trap signals from the mouse. After all, OS-9 treats a signal similar to an error. Down the yellow brick road we traveled. I wrote *SigTestOne* at the terminal and proudly typed run.

Unfortunately, the result was nothing to be proud of! *SigTestOne* did work — almost! When I clicked the mouse button, the program jumped to the ON ERROR GOTO routine at Line 100 as planned. However, the error number reported by the program was #000 — the signal to “kill” a process.

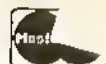
```

138D _tenlts(3). _mmttl:="Calendar"+EndStr
13D6 _tsultms(3). _mlenbl:=-MNEEnbl
13E4 _tanlts(4). _mmttl:="Control"+EndStr
13FC _tanlts(4). _mlenbl:=-MNEEnbl
147A _tanlts(5). _mmttl:="Printer"+EndStr
1422 _tanlts(5). _mlenbl:=-MNEEnbl
1439 _tanlts(6). _mmttl:="Port"+EndStr
1445 _tanlts(6). _mlenbl:=-MNEEnbl
1453 _tenlts(7). _mmttl:="Help"+EndStr
1468 _tenlts(7). _mlenbl:=-MNEEnbl
1476 _tenlts(8). _mmttl:="Shell"+EndStr
148C _tanlts(8). _mlenbl:=-MNEEnbl
149A _tanlts(9). _mmttl:="Clipboard"+EndStr
1484 _tanlts(9). _mlenbl:=-MNEEnbl
14C2
14C3
14C4
DIM _filltms(6):M1str
14D2 _filltms(1). _mmttl:="New"+EndStr
14E6 _filltms(1). _mlenbl:=-MNEEnbl
14F4 _filltms(2). _mmttl:="Open"+EndStr
1509 _filltms(2). _mlenbl:=-MNEEnbl
1517 _filltms(3). _mmttl:="Save"+EndStr
152C _filltms(3). _mlenbl:=-MNEEnbl
153A _filltms(4). _mmttl:="Abandon"+EndStr
1552 _filltms(4). _mlenbl:=-MNEEnbl
1569 _filltms(5). _mmttl:="Print"+EndStr
1576 _filltms(5). _mlenbl:=-MNEEnbl
1584 _filltms(6). _mmttl:="Quit"+EndStr
1599 _filltms(6). _mlenbl:=-MNEEnbl
15A7
15A8
DIM _edltms(6):M1str
15B6 _edltms(1). _mmttl:="Undo"+EndStr
15CB _edltms(1). _mlenbl:=-MNEEnbl
15D9 _edltms(2). _mmttl:="Cut"+EndStr
15ED _edltms(2). _mlenbl:=-MNEEnbl
15FB _edltms(3). _mmttl:="Copy"+EndStr
1619 _edltms(3). _mlenbl:=-MNEEnbl
161E _edltms(4). _mmttl:="Paste"+EndStr
1634 _edltms(4). _mlenbl:=-MNEEnbl
1642 _edltms(5). _mmttl:="Clear"+EndStr
1658 _edltms(5). _mlenbl:=-MNEEnbl
1666 _edltms(6). _mmttl:="Show"+EndStr
167B _edltms(6). _mlenbl:=-MNEEnbl
1689
(* Now we'll set up the entire menu
168A
DIM Tndy_Mn:M1str
1687 Tndy_Mn._mmttl:="Tandy"+EndStr
16CB Tndy_Mn._mmlid:=-MN_Tndy
16D7 Tndy_Mn._mxsiz:=-19
16E2 Tndy_Mn._mnltts:=-9
16ED Tndy_Mn._mnenabl:=-MNEEnbl
16F9 Tndy_Mn._mmltms:=-ADDR(_tenlts)
1707
DIM File_Mn:M1str
1711 File_Mn._mmttl:="Files"+EndStr
1725 File_Mn._mmlid:=-MN_File
1731 File_Mn._mxsiz:=-19
173C File_Mn._mnltts:=-6
1747 File_Mn._mnenabl:=-MNEEnbl
1753 File_Mn._mmltms:=-ADDR(_filltms)
1761
DIM Edit_Mn:M1str
1768 Edit_Mn._mmttl:="Edit"+EndStr
177E Edit_Mn._mmlid:=-MN_Edit
178A Edit_Mn._mxsiz:=-19
1795 Edit_Mn._mnltts:=-6
17A9 Edit_Mn._mnenabl:=-MNEEnbl
17AC Edit_Mn._mmltms:=-ADDR(_edltms)
17BA
(* Now that we have defined the items in the menu and the menu itself,
17BB (* we can define the window that we want the menu to appear in.
1801 (* First, we must create an array of menus that contains all of the
1849 (* menus we hope to use. After we have reserved space in memory using
1883 (* Basic99's DIM statement, we must initialize each element in the array.
18C9 (* Here, we create an array of three menus.
1912
193D
193E
194C
DIM Menus(3):M1str
194D
1958 Menus(1):=Tndy_Mn
1963 Menus(2):=File_Mn
1962 Menus(3):=Edit_Mn
196F
WndScr._wmttl:="KISSDraw"+EndStr
1986 WndScr._nmens:=-3
1991 WndScr._wxmin:=-89
199C WndScr._wymn:=-24
19A7 (* _wres, an array of seven reserved bytes, sits here
19DD WndScr._wnsync:=-WINSync
19E9 WndScr._wnmen:=-ADDR(Menus)
19F7
19FB (* The data structures have all been set up now. It is time to make a

```




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I looked over my code. Stumped, I picked up the phone and called Kevin Darling. "It'll work, but you have to pack the code first," he said.

I did. It did! But this solution was not appropriate. One of the advantages of an interactive programming environment like BASIC09 is the fact that you can change things continuously and check the results instantly. If you are forced to go into a "packed" (compiled before you run it) mode, you lose this interactive advantage.

Generating a Real Intercept

Kevin Darling did a lot of experimenting with *Multi-View* early on. One of those experiments involved programming *WindInt* using BASIC09. He also stumbled into the problem above. He solved it by using the ON ERROR GOTO approach in conjunction with a Boolean variable. If the Boolean "packed" was true, he used the MsSig SetStat call to tell the mouse to return a signal with a value of 2. If "packed" was false, it returned a 1 signal. If the code hadn't been packed, the ON ERROR GOTO routine received a valid "wake up" signal — 1 — and Darling was able to go ahead and process it.

I wanted a simpler approach. I get confused easily when I must follow Boolean variables through decision trees, and I wanted to keep the overall flow of the program as simple as possible. After all, this is "KISSable OS-9."

"Why can't I write a short intercept routine in machine language, store it in the data area, point to it using BASIC09's ADDR function, and run it?" I asked.

"Great idea!" Darling said. "It should work."

With that, I was off on a daylong experiment. As it turned out, my intercept routine was only four bytes long. I used a fifth byte to return the value of the signal sent by the mouse. Here's the code in 6809 assembly language:

```
STB #ADDR(IceptCode)+4
RTI
```

In pure machine language that code looks like this: F7 HH LL 38.

To get that code into memory I defined a special data type named IntCeptCod. I then dimensioned — or reserved space for — a variable named IceptCode of type IntCeptCod. The new data type had a single byte followed by an integer to hold the address, followed by two individual bytes. The first would hold the RTI code. The second gave me an empty byte in mem-

```
1A3E      (* set status call to initialize the window. We will use __ss_wset. This
1A87      (* call needs three parameters. The path number, the window type and a
1ACF      (* pointer to the data structure defining the window.
1B94
1B95      (* But first, we must turn off the cursor
1B2E      (* If we don't, we will occasionally write garbage on the
1B67      (* screen where we don't want it. A "gfx2" routine will
1B9F      (* take care of this for us.
1B8B      RUN Cfx2(SrdOur,"CurOff")
1BCE
1BCF      (* Now we'll make a SysCall with the Set Window function
1C07      (* code to prove that it works.
1C26
1C27      CallCode:=$8E \(* Set Status Code
1C41      Regs.a:=StdOut
1C4D      Regs.b:=$86 \(* SS.WnSet function code
1C72      Regs.x:=ADDR(WndScr)
1C89      Regs.y:=-WT_FWin
1C8C
1C8D      RUN SysCall(CallCode,Regs)
1C9C      PRINT #StdOut,"Hello <Insert Your Name Here>"
1CC2      END
1CC4
```

Listing 2: SigTestOne

```
PROCEDURE SigTestOne
0000      (* Short program to test method of emulating intercept routine
003E
003F      DIM ErrNum:BYTE
0046
0047      ON ERROR GOTO 100 \(* Set trap
0058
0059      (* Initialize Mouse and start it running
0091
0092      TYPE Registers=cc,a,b,dp:BYTE; x,y,u:INTEGER
00A7
00A8      DIM Regs:Registers
00B1      DIM CallCode,Fath,StdIn,StdOut:BYTE
00C4      DIM Follow,FollowNot:BYTE
00CF      DIM SampTime:INTEGER
00D6      DIM bval,ccval:BYTE
00E1
00E2      Follow:=1
00E9      FollowNot:=0
00F0      StdIn:=0
00F7      StdOut:=1
00FE      SampTime:=$039A
0106
0107      CallCode:=$8E \(* I_SetStat call
011F      Fath:=StdIn
0127      Regs.a:=Fath
0133      Regs.b:=$89 \(* ss.Mouse
014A      Regs.x:=SampTime
0156      RUN SysCall(CallCode,Regs)
0165
0166      (* Now tell Mouse to return a signal with a value of 10
019D
019E      CallCode:=$8E \(* I_SetStat call
01B6      Fath:=StdIn
01BE      Regs.a:=Fath
01CA      Regs.b:=$8A \(* ss.MsSig
01E1      Regs.x:=$9A \(* $099A is 10
01F3
01FC      RUN SysCall(CallCode,Regs)
0203
020C      PRINT "Test is starting, click mouse!"
022E
022F      (* Now stall for test
0244
0245      FOR xrey:=1 TO 10000
0258      NEXT xrey
0263
0264      PRINT "Test is stopping now"
027C      END
027E
027F 100 ErrNum:=ERR
028B      bval:=Regs.b
0293      ccval:=Regs.cc
029E      PRINT bval,ccval,ErrNum
02AB      IF ErrNum=10 THEN PRINT "It's the Mouse"
02C8      ELSE
02CC          PRINT "Who knows?"
02DA      ENDIF
02DC      END
02DE
```


Listing 3: SigTestTwo

```

PROCEDURE SigTestTwo
0000  (* Procedure to test possibility of setting intercept
0001  (* trap within Basic09 program
0002  (* First, we define a special data type for our intercept
0003
0004  TYPE IntCptCod=St8Code:BYTE; IntAddr:INTEGER; RTICode,IntResult
0005
0006  :BYTE
0007  DIM IceptCod:IntCptCod
0008
0009  (* Now that we have defined the data area where we will store
0010  (* our intercept code, we will initialize it.
0011
0012  IceptCod.St8Code:=5F7
0013  IceptCod.IntAddr:=ADDR(IceptCod)+4
0014  IceptCod.RTICode:=538
0015
0016  (* We must also define a data type to hold the 6809 registers
0017  (* so we can pass the parameters to SysCall.
0018
0019  TYPE Registers=cc,a,b,dp:BYTE; x,y,u:INTEGER
0020  DIM Regs:Registers
0021
0022  (* And a few more variables to enhance readability
0023
0024  DIM F_Icpt,F_Sleep,CallCode:BYTE
0025  DIM I_SetStt,SS_MsSig,StdIn,StdOut,SS_GIP,SS_Mouse:BYTE
0026  DIM MouseSig,Follow:INTEGER
0027  DIM Crp_Ptr,Ptr_Arr:BYTE
0028
0029  Crp_Ptr:=202
0030  Ptr_Arr:=1
0031  F_Icpt:=509
0032  F_Sleep:=50A
0033  I_SetStt:=58E
0034  SS_MsSig:=58A
0035  SS_GIP:=594
0036  SS_Mouse:=589
0037  Follow:=1
0038  StdIn:=0
0039  StdOut:=1
0040  MouseSig:=10
0041
0042  (* We must turn on the mouse and set its global parameters
0043  (* Here we tell the system we are using a high resolution
0044  (* mouse plugged into the right joystick port.
0045
0046  Regs.a:=StdIn
0047  Regs.b:=SS_GIP
0048  Regs.x:=50101 \(* HiRes, Right Joystick
0049  Regs.y:=5FFF \(* Do not change timing
0050  CallCode:=I_SetStt
0051  RUN SysCall(CallCode,Regs)
0052  PRINT "I have set the mouse's global parameters"
0053
0054  (* Now we must tell the mouse how often to update itself
0055  (* and when it should timeout. We also must tell the
0056  (* graphics cursor to follow the mouse. We do the latter
0057  (* by setting the 6809 Y-register to "Follow" or "1" before
0058  (* the call. This parameter is undocumented in early versions
0059  (* of the OS-9 Level II documentation.
0060
0061  Regs.a:=StdIn
0062  Regs.b:=SS_Mouse
0063  Regs.x:=50301 \(* Update / timeout info
0064  Regs.y:=Follow
0065  CallCode:=I_SetStt
0066  RUN SysCall(CallCode,Regs)
0067  PRINT "I have started mouse."
0068
0069  (* Now we can set up the 6809 registers and make the call
0070  (* to set up the intercept.
0071
0072  CallCode:=F_Icpt
0073  Regs.x:=ADDR(IceptCod)
0074  Regs.u:=ADDR(IceptCod)+4
0075  RUN SysCall(CallCode,Regs)
0076  PRINT "I have set the intercept"
0077
0078  (* We'll turn on the Graphics Cursor so you can
0079  (* watch mouse movement on the screen. We'll make
0080  (* it an arrow.
0081
0082  RUN gfx2("gcaet",Crp_Ptr,Ptr_Arr)
0083
0084  (* The main loop of our future program will start here
0085
0086  LOOP \(* Do this forever
0087
0088
0089
0090
0091
0092
0093
0094
0095
0096
0097
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0100
0101
0102
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0199
0200

```

ory I could use to store the signal from the mouse.

After dimensioning the variable IceptCod, I initialized it with straightforward BASIC09 assignment statements. Later in the program, I used SysCall to run the OS-9 F\$Icpt routine. To do this, I loaded the 6809's X register with the address of the "intercept" routine I had stored in BASIC09's data area, loaded the U register with the address where I wanted to receive the signal from the mouse, and made the call.

Later, after the process had been awakened by the mouse, I could check the value of IceptCod.IntResult to see if the mouse had generated the signal. This week, we are returning only one signal from the mouse. Later, we'll most likely have the mouse send back different signals to indicate different situations. Stay tuned, this project just might turn into a lot of fun.

A Trip Through the Code

We used a few SysCall functions when we presented the *KISSDraw* series last year, but not too many. Perhaps this is a good time for a review of the technique. Essentially, running a SysCall is similar to running a GOSUB. Both statements run a subroutine. The difference lies in where the subroutines are located.

When you type GOSUB 1000, you are telling BASIC09 to jump to a subroutine that is located at Line 1000 in your program. After it runs that subroutine, BASIC09 will return the control of the program to the line following the GOSUB statement.

SysCall is a jump to a subroutine within the heart of the OS-9 operating system itself. When control returns from the SysCall to your BASIC09 program, execution continues at the line following the SysCall - just like it does with the GOSUB statement.

The subroutines you call with the SysCall function are executed by loading the 6809's B register with a special CallCode. You must also often pass additional information to the OS-9 subroutine when you run SysCall.

When you make one of these system calls from within an assembly language program, you load the 6809 registers directly and then make the call. This means that when you want to run them from BASIC09 you must have a way to preload the 6809 registers before you run SysCall. You do this by creating a special data type that effectively emulates a 6809 microprocessor. In

SigTestTwo we call this new data type Registers. After we define it, we reserve a space in memory for it with the BASIC9 DIM statement. We named that space Regs.

To run SysCall then, we load our pseudo 6809 — Regs — with the proper information and then run SysCall with two parameters. The first parameter is always the calling code. The second is always Regs, the pseudo 6809.

We know what kind of information to put in each register by consulting the OS-9 technical documentation. It lists each call separately and gives the entry and exit conditions. By entry conditions, we mean it tells us what to load into each register before we run SysCall. The exit conditions tell us what we can expect to find in each of the 6809's registers upon exit. When we run SysCall, we will find these exit values in the pseudo 6809, Regs.

Readability Can't Be Overlooked

Let's use our call to the internal OS-9 function MsSig for a readability example. Take a look at it now:

```
Regs.a:=StdIn
Regs.b:=SS_MsSig
Regs.x:=MouseSig
CallCode:=I_SetStt
RUN SysCall(CallCode,Regs)
```

When you read this code, you can determine in English what you are loading into each of the 6809's registers as well as the function you want to run. Now consider this—the program would have worked in exactly the same manner if we had decided to type the following:

```
Regs.a:=0
Regs.b:=$8A
Regs.x:=10
CallCode:=$8E
RUN SysCall(CallCode,Regs)
```

Do you think you would remember what the second string of code would do if you read it two weeks after you wrote it? I certainly wouldn't! Notice how we reserved space and initialized all of these variables early in the program. Once we type

```
Grp_Ptr:=202
Ptr_Arr:=1
```

we could type Run gfx2("gcset", Grp_Ptr,Ptr_arr), rather than Run gfx2("gcset",202,1).

Which of those lines means more to you?

```
9733 PRINT
9735 PRINT "Type <Control D> or <BREAK> to stop !!!"
9769
9761 IceptCode.IncResult:=0 \(* Initialize Signal Report
9787
9788 (* Tell mouse which signal you want
97AB (* it to return when the button is pushed. Do
97D9 (* this with the SS_MsSig set status call
9802
9803 Regs.a:=StdIn
9804 Regs.b:=SS_MsSig
9805 Regs.x:=MouseSig
9818 CallCode:=I_SetStt
9827 RUN SysCall(CallCode,Regs)
982F PRINT "I have given the mouse a signal to send back to the process."
983E PRINT "Now, I am putting the process to sleep."
987E
98A9
98AA (* Now we must tell the process to go to sleep until
98DE (* it receives a signal to wake up.
9901
9902 CallCode:=F_Sleep
990A Regs.x:=0 \(* Sleep forever -- at least till signal
993D RUN SysCall(CallCode,Regs)
994C
994D (* After a signal or interrupt wakes up the system, we
9984 (* should be able to find out if it was the mouse
9985 (* that generated the signal by looking at IceptCode.Result
99F0 (* When we arrive here, the process has just awakened
9A25 (* and we will test to see if the signal came from the
9A5B (* mouse.
9A64
9A65 EXITIF IceptCode.IncResult=2 THEN
9A74 ENDEXIT
9A78
9A79 PRINT "MouseSig is now, "; MouseSig
9A92 PRINT "IceptCode.IncResult is now, "; IceptCode.IncResult
9AB9 IF IceptCode.IncResult=MouseSig THEN
9AC9 PRINT "It's the Mouse!!!"
9ADE ELSE
9AE2 PRINT "The signal returned was, "; IceptCode.IncResult
9B06 ENDIF
9B98 ENDOOP
989C
989D (* Always turn off graphics cursor before leaving program
9846
9847 RUN gfx2("gcset",0,0)
985A
985B END
985D
985E
```

Listing 4: SkipMuf (continued from last month)

```
567 0 1 (*
568 0 1 * Askabort - Asks user if he wants to abort computation in order
569 0 1 * to reenter data.
570 0 1 *)
571 0 1
572 0 1 PROCEDURE Askabort(VAR path : text);
573 0 1
574 0 1 BEGIN
575 0 2 Clrscrn(path);
576 0 2 Write(path, 'Prediction for: ', name);
577 24 2 IF (cali[1] < ' ') THEN
578 39 3 Write(path, ' ', cali);
579 57 2 WriteLn(path);
580 62 2 Write(path, 'Data: ', day:2;0, ' ', moname:3, ' ');
581 102 2 WriteLn(path, 'SSN: ', sunspot:3;0, ' Flux: ', flux:3;0);
582 139 2 Write(path, 'To: ', centnt, ' (', ocity, ' ', aentry, ' ');
583 197 2 WriteLn(path, 'Lat ', olar:6;2, ' Lon ', olen:7;2);
584 234 2 WriteLn(path);
585 241 2 Write(path, 'Continue computation (Y/N)? ');
586 253 2 Prompt(path);
587 258 2 ReadLn(path, answer);
588 268 2 ReadLn(path, answer);
589 280 2 Rewrite(path);
590 290 2 END;
593 0 1 (*
594 0 1 * Wantprnt - Asks if user wants printout on printer.
595 0 1 *)
596 0 1
597 0 1 PROCEDURE Wantprnt(VAR path : text);
598 0 1
599 0 1 VAR
600 0 1 answer : char;
601 0 1
602 0 1 BEGIN
603 0 2 Write(path, 'Want printout of results (Y/N)? ');
604 14 2 Prompt(path);
605 17 2 ReadLn(path);
```



```

706 27 2   Readln(path, answer);
707 37 2   Rewrite(path);
708 47 2   IF ((answer = 'Y') OR (answer = 'y')) THEN
709 61 3     printout := TRUE
710 61 3   ELSE
711 69 3     printout := FALSE;
712 74 2   END;

715 0 1  (*
716 0 1  * Hourmuf - computes MUF for specific hour of day.
717 0 1  *)
718 0 1
719 0 1   FUNCTION Hourmuf(olat,olon,mylat,mylon,p,q,r,s,k7,hour:real):real;
720 0 1
721 0 1   CONST
722 0D 1     e      = 2.718281828;
723 0D 1     pi     = 3.14159265;
724 0D 1     twopi  = 6.28318531;
725 0D 1     halfpi = 1.57079633;
726 0D 1
727 0D 1   VAR
728 0D 1     g1,k5,j9,k1,a,b,c,d,w9:real;
729 -50D 1     l9,y1,y2,k8,k9,g9,m9,t,t4,c9,t9,t6,g9:real;
730 -115D 1     g8,u,g7,g2,u1,n2,u3,step,test:real;
731 -160D 1
732 -160D 1
733 -160D 1   FUNCTION Acs (x:real):real;
734 0D 2
735 0D 2   VAR
736 0D 2     result : real;
737 -5D 2
738 -5D 2   BEGIN
739 0 3     result := halfpi - Arctan(x / sqrt(-x * x + 1));
740 31 3     acs := result
741 31 3   END;
742 0 2
743 0 2
744 0 2   FUNCTION Rpower (y,x:real):real;
745 0 2
746 0 2   VAR
747 0D 2     result:real;
748 -5D 2
749 -5D 2   BEGIN
750 0 3     IF x = 0.0
751 5 3       THEN result := 1.0
752 15 4       ELSE result := Exp(x * Ln(y));

```

Here's another programming tip. Debugging can be awful if you don't give yourself enough clues. That's the purpose of all those `Print` statements in *SigTestTwo*. Every time I run a `SysCall`, I print a report on the screen to let me know where I am in the program. By looking at these reports, I can tell when or if the program goes astray.

Caveats and What Comes Next?

Before we secure this tutorial and turn you loose to run the code, you should take one or two precautions. First, you must run *SigTestTwo* in a graphics window. You cannot run the `gfx2` `gcset` function to display the mouse pointer in a text type window. Additionally — for a reason as yet unknown — you must run *SigTestTwo* from a shell that was not created by *Multi-Vue*. We'll be looking deeper into this slight inconvenience to see if we can find the cause. Cross your fingers! You can, however, run *SigTestTwo* from a shell created by another shell that was not started by *Multi-Vue*.

In other words, you can have *Multi-Vue* running in one window and a second shell running in another window. Then, start *SigTestTwo* in this

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second window. However, if you use the SHELL command under the Files menu to create a third shell, you will not be able to run *SigTestTwo* under it. For some reason, if you are running in a shell created by *Multi-View*, the signal returned when you click the mouse in *SigTestTwo* is zero — the signal to kill the process. And, as you might guess, that's exactly what happens. It's interesting to note that Kevin Darling's *MVTest*, another BASIC90 program, exhibits exactly the same behavior — and he uses the special packed Boolean / ON ERROR GOTO algorithm. Fixing this one just might be a real challenge.

"The next step in the evolution of MVShell will be to add the code from SigTestTwo to the tail-end of the code in this month's MVShell."

Another caveat comes with using *SigTestTwo* in its present form. Once you have run this procedure, you will not be able to use the BREAK key or the CTRL-E key combination from within BASIC90 without restarting BASIC90. This happens because our own intercept routine in *SigTestTwo* takes the place of the intercept routine BASIC90 sets. The solution to this problem isn't too difficult but would have made the code for this month's tutorial too long. We'll try to get it in next month. If you want to jump ahead of us, here are the steps you will need to follow at the start of your BASIC90 program:

- Get BASIC90's Process ID using a `GetID SysCall`
- Use `SysCall` to run `F$GetProc`
- Save the 512-byte array returned by `F$GetProc` into an array
- Save the intercept vector address and data address in another variable
- Use the intercept `SysCall` to restore them before you exit your program

You must also remember that if you set your own intercept like we did in *SigTestTwo*, the ON ERROR GOTO function will no longer work. You will need to process the expected errors each time with your own code, which you wake up following a signal.

The next step in the evolution of *MVShell* will be to add the code from *SigTestTwo* to the tail-end of the code in this month's *MVShell*. Additionally, we'll need to add calls to *WindInt's* `SS_MnSel`, `SS_UMBar` and, if we have

```

753 41 3      rpower := result
754 41 3      END;
755  2 2
756  2 2
757  2 2      FUNCTION Checkval (x:real):real;
758  2 2
759  2 2      BEGIN
760  2 3          IF (x >= 1.0) OR (x <= -1.0)
761 22 3              THEN
762 26 4                  IF x >= 1.0
763 29 4                      THEN x := 0.999999999
764 39 5                      ELSE x := -0.999999999;
765 60 3          checkval := x
766 60 3      END;
767  2 2
768  2 2
769  2 2      FUNCTION Sgn (x:real):real;
770  2 2
771  2 2      VAR
772  2 2          result:real;
773  2 2
774  2 2      BEGIN
775  2 3          IF x < 0.0
776  5 3              THEN result := -1.0;
777 24 3          IF x = 0.0
778 27 3              THEN result := 0.0;
779 46 3          IF x > 0.0
780 49 3              THEN result := 1.0;
781 60 3          sgn := result
782 60 3      END;
783  2 2
784  2 2
785  2 2      FUNCTION Minusexp (x:real):real;
786  2 2
787  2 2      VAR
788  2 2          result:real;
789  2 2
790  2 2      BEGIN
791  2 3          result := Rpower((1.0 / e), (-1.0 * x));
792 33 3          minusexp := result
793 33 3      END;
794  2 2
795  2 2
796  2 2      BEGIN (hourmuf)
797  2 2          k7 := Checkval(k7);
798 12 2          g1 := Acs(k7);
799 22 2          k6 := 1.59 * g1;
800 35 2          IF k6 < 1.0
801 38 2              THEN k6 := 1.0;
802 57 2          k5 := 1.0 / k6;
803 70 2          IF k5 < 1.0
804 73 2              THEN k5 := 1.0;
805 92 2          j9 := 100.0;
806 191 2          a := (x - p * Cos(g1)) / (q * Sin(g1));
807 127 2          y1 := 0.0172 * (10.0 + (month - 1.0) * 30.4 + day);
808 165 2          y2 := 0.409 * Cos(y1);
809 180 2          k1 := 1.0 / (2.0 * k6);
810 200 2          test := Abs(1.0 - k1);
811 214 2          step := Abs(0.9999 - 2 * k1);
812 231 2          REPEAT
813 231 2              b := g1 * k1;
814 241 3              c := p * Cos(b) + q * Sin(b) * a;
815 270 3              d := (Cos(b) - c * p) / (q * Sqrt(1.0 - c * c));
816 307 3              d := Checkval(d);
817 317 3              d := Acs(d);
818 327 3              w9 := mylon + Sgn(Sin(olon - mylon)) * d;
819 351 3              IF (w9 < 0.0) OR (w9 >= twopi)
820 371 3                  THEN
821 375 4                      IF w9 < 0.0
822 378 4                          THEN w9 := w9 + twopi;
823 391 5                      ELSE w9 := w9 - twopi;
824 417 3              c := Checkval(c);
825 427 3              l9 := halfpi - Acs(c);
826 444 3              k8 := 3.02*w9+10.0+0.13*(Sin(y1)+1.2*Sin(2*y1));
827 493 3              k8 := k8-12.0*(1+Sgn(k8-24.0))*Sgn(Abs(k8-24.0));
828 545 3              IF Cos(10 + y2) <= -0.26
829 554 3                  THEN BEGIN (then 1)
830 564 4                      k9 := 0.0;
831 573 4                      g9 := 0.0;
832 582 4                      m9 := 2.5 * g1 * k5;
833 599 4                      IF m9 > halfpi
834 602 4                          THEN m9 := halfpi;
835 621 4                      m9 := Sin(m9);
836 629 4                      m9 := 1.0 + 2.5 * m9 * Sqrt(m9);
837 655 4                      END (then 1)
838 655 4                  ELSE BEGIN (else 1)
839 658 4                      k9 := (-0.26+Sin(y2)*Sin(l9))/(Cos(y2)*Cos(l9)
840 684 4                          +0.001);
841 698 4                      k9 := 12.0-Arctan(k9/Sqrt(Abs(1.0-k9*k9)))
842 725 4                          *7.639437;
843 738 4                      t := k8-0.5*k9+12.0*(1.0-Sgn(k8-0.5*k9))
844 786 4                          *Sgn(Abs(k8-0.5*k9));
845 811 4                      t4 := k8+0.5*k9-12.0*(1.0+Sgn(k8+0.5*k9-24.0))
846 863 4                          *Sgn(Abs(k8+0.5*k9-24.0));

```


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time, the code to process a few of the menu selections. Hopefully, by the time we finish the project you'll have all of *Multi-View's* desk accessories and other functionality available to you from each of your BASIC09 programs.

Other Good News and Notes

The new GShell from Kent Meyers keeps getting better. I'm still running one of the very early versions, and it sings. However, conversations with several people around the country tell me I'm really missing out. The later versions really shine! For example, we now have a wastebasket on our desktop. And thanks to Kent's ingenuity, it's easier to use than the one on the Macintosh. On the Macintosh you must drag your files to the wastebasket. On our Color Computer 3 with the new GShell, you merely click on the file you want to throw away to select it. Then, move the mouse to the wastebasket and click. Presto! All gone!

Additionally, if you put a ? in your AIF file with the new GShell, you will get a prompt for additional parameters. And Meyers has come up with a simple modification to SCF and CC3io that lets you continue after a pause by clicking the mouse anywhere on the screen. He also redid the "Sure ?" box so that it pops up right where your mouse is sitting when you activate an action from the menu bar that requires it. And if that's not enough, there's now a quick shell. When you need another shell, just press S. Magic!

But we've saved the real good news for last. This is another cross-your-fingers revelation, however, because this column will be printed after the fact — but the OS-9 Users Group plans to sell the IPatch that generates the new GShell from the original Tandy file at RAINBOWfest Chicago. Hope you were there to get a copy.

Speaking of the Users Group, the address is Suite R-237, 1715 Fowler Ave., Tampa, FL 33612. The cost for an individual membership is just \$25 per year. The benefits are many and include access to a growing library of valuable public domain software and a subscription to *MOTD*, the UG newsletter. Dave Kaleita, Pete Lyall, Kevin Darling, George Dorner and Carl Kreider are doing a heck of a job. Join them!

And speaking of credit — Ron Lam-mardo's name was somehow edited out of our praises of the new Shell+, Ron provided many of the ideas for this team project and wrote the latest version. Great job, Ron! □

```

847 895 4      c9 := Abs(Cos(19 + y2));
848 998 4      t9 := 9.7 * Rpower(c9,9,6);
849 931 4      IF t9 <= g,1
850 934 4      THEN t9 := g,1;
851 953 4      m9 := 2.5 * g1 * k5;
852 979 4      IF m9 > halfpi
853 973 4      THEN m9 := halfpi;
854 992 4      m9 := Sin(m9);
855 1999 4      m9 := 1.9 + 2.5 * m9 * Sqrt(m9);
856 1927 4      IF ((t4<t) AND ((hour-t4)*(t-hour)<=g,9))
857 1957 4      OR ((t4>=t) AND ((hour-t)*(t4-hour)>g,9))
858 1987 4      THEN BEGIN (then 2)
859 1991 5          t6 := hour+12.9*(1.9+Sgn(t-hour))
860 1118 5              *Sgn(Abs(t-hour));
861 1136 5          g9 := pi * (t6 - t) / k9;
862 1157 5          g8 := pi * t9 / k9;
863 1174 5          u := g.5 * (t - t6) / t9;
864 1195 5          IF u < g,9
865 1198 5              THEN u := Minusexp(u)
866 1212 6              ELSE u := Exp(u);
867 1229 5          u1 := -g.5 * k9 / t9;
868 1247 5          IF u1 < g,9
869 1259 5              THEN u1 := Minusexp(u1)
870 1264 6              ELSE u1 := Exp(u1);
871 1283 5          u2 := g.25 * (k9 - 24.9);
872 1393 5          IF u2 < g,9
873 1396 5              THEN u2 := Minusexp(u2)
874 1329 6              ELSE u2 := Exp(u2);
875 1337 5          g9 := c9*(Sin(g9)+g8*(u*u-Cos(g9)))
876 1363 5              /(1.9+g8*g8);
877 1382 5          g7 := c9*(g8*(u1*u1+1.9))*u2
878 1498 5              /(1.9+g8*g8);
879 1439 5          IF g9 < g7
880 1433 5              THEN g9 := g7
881 1449 6      END (then 2)
882 1446 5      ELSE BEGIN (else 2)
883 1449 5          t6 := hour+12.9*(1.9+Sgn(t4-hour))
884 1476 5              *Sgn(Abs(t4-hour));
885 1494 5          g8 := pi * t9 / k9;
886 1511 5          u := g.25 * (t4 - t6);
887 1528 5          IF u < g,9
888 1531 5              THEN u := Minusexp(u)
889 1559 6              ELSE u := Exp(u);
890 1567 5          u1 := -g.5 * k9 / t9;
891 1585 5          IF u1 < g,9
892 1588 5              THEN u1 := Minusexp(u1)
893 1692 6              ELSE u1 := Exp(u1);
894 1619 5          g9 := c9*(g8*(u1*u1+1.9))*u/(1.9+g8*g8)
895 1663 5      END; (else 2)
896 1667 4      END; (else 1)
897 1667 3      g2 := (1.9+g,994*sunepot)*m9*Sqrt(6.9+58.9*Sqrt(g9));
898 1713 3      u3 := k9 / 6.9 - 4.9;
899 1733 3      IF u3 < g,9
900 1736 3          THEN u3 := Minusexp(u3)
901 1759 4          ELSE u3 := Exp(u3);
902 1767 3      g2 := g2 * (1.9 - g,1 * u3 * u3);
903 1796 3      g2 := g2*(1.9+(1.9-Sgn(olat))*Sgn(mylat))*g,1;
904 1839 3      g2 := g2*(1.9-g,1*(1.9+(Sgn(Abs(Sin(19)))-Cos(19)))));
905 1883 3      IF g2 <= j9
906 1886 3          THEN j9 := g2;
907 1899 3      k1 := k1 + step;
908 1909 3      UNTIL (k1 >= test);
909 1919 2      hourmuf := j9;
910 1925 2
911 1925 2      END; (hourmuf)
912 1925 2
913 1925 2      END; (hourmuf)
914 1925 2      END; (hourmuf)
915 1925 2      END; (hourmuf)
916 1925 2      END; (hourmuf)
917 1925 2      END; (hourmuf)
918 1925 2      END; (hourmuf)
919 1925 2      END; (hourmuf)
920 1925 2      END; (hourmuf)
921 1925 2      END; (hourmuf)
922 1925 2      END; (hourmuf)
923 1925 2      END; (hourmuf)
924 1925 2      END; (hourmuf)
925 1925 2      END; (hourmuf)
926 1925 2      END; (hourmuf)
927 1925 2      END; (hourmuf)
928 1925 2      END; (hourmuf)
929 1925 2      END; (hourmuf)
930 1925 2      END; (hourmuf)
931 1925 2      END; (hourmuf)
932 1925 2      END; (hourmuf)
933 1925 2      END; (hourmuf)
934 1925 2      END; (hourmuf)
935 1925 2      END; (hourmuf)
936 1925 2      END; (hourmuf)
937 1925 2      END; (hourmuf)
938 1925 2      END; (hourmuf)
939 1925 2      END; (hourmuf)
940 1925 2      END; (hourmuf)
941 1925 2      END; (hourmuf)
942 1925 2      END; (hourmuf)

```



```

943 150 3      results[loopcount] := Hourmuf(lat1, lon1, lat2, lon2,
944 176 3      p, q, r, s, k7, hour);
945 198 3      Write(path, ' ');
946 212 3      Prompt(path);
947 215 3      END;
948 229 2      END;
951 0 1 (*
952 0 1 * Showmuf - displays computation results on screen.
953 0 1 *)
954 0 1
955 0 1      PROCEDURE Showmuf(VAR path : text);
956 0 1
957 0 1      VAR
958 00 1          loopcount : integer;
959 20 1          oft      : real;
960 70 1          hpf      : real;
961 120 1
962 120 1      BEGIN
963 0 2          Clrscrn(path);
964 6 2          WriteLn(path, 'HOUR OFT(MHZ) MUF(MHZ) HPF(MHZ)');
965 19 2          FOR loopcount := 1 TO 23 DO BEGIN
966 31 3              oft := 0.85 * results[loopcount];
967 57 3              hpf := 1.15 * results[loopcount];
968 83 3              WriteLn(path, loopcount:3, ' ', oft:6:1, results[loopcount]:9:1,
969 129 3                  hpf:9:1);
970 149 3          END;
971 152 2          oft := 0.85 * results[24];
972 173 2          hpf := 1.15 * results[24];
973 194 2          WriteLn(path, ' 24. ', oft:6:1, results[24]:9:1, hpf:9:1);
974 239 2          Prompt(path);
975 241 2      END;
978 0 1 (*
979 0 1 * Graphmuf - display graph of OFT, MUF, & HPF on screen
980 0 1 *)
981 0 1      PROCEDURE Graphmuf(VAR path : text);
982 0 1
983 0 1      VAR
984 00 1          loopcount, x, y : integer;
985 60 1
986 60 1      BEGIN
987 0 2          Gwset(path, 1, 32, 0, 40, 24, 2, 0);
988 15 2          Curoff(path);
989 19 2          Stalessw(path, 0);
990 24 2          Setdptr(path, 16, 0);
991 30 2          Box(path, 376, 175);
992 40 2          FOR loopcount := 1 TO 5 DO BEGIN
993 50 3              x := (60 * loopcount) + 16;
994 57 3              Setdptr(path, x, 0);
995 63 3              Line(path, x, 175);
996 71 3          END;
997 83 2          FOR loopcount := 2 TO 10 DO BEGIN
998 93 3              y := 175 - Round(Log10(loopcount) * 100);
999 109 3              Setdptr(path, 16, y);
1000 115 3              Line(path, 376, y);
1001 123 3          END;
1002 135 2          FOR loopcount := 2 TO 4 DO BEGIN
1003 145 3              y := 175 - Round(Log10(10 * loopcount) * 100);
1004 163 3              Setdptr(path, 16, y);
1005 169 3              Line(path, 376, y);
1006 177 3          END;
1007 189 2          Curxy(path, 0, 1); Write(path, '40'); Prompt(path);
1008 208 2          Curxy(path, 0, 3); Write(path, '30'); Prompt(path);
1009 227 2          Curxy(path, 0, 5); Write(path, '20'); Prompt(path);
1010 246 2          Curxy(path, 0, 9); Write(path, '10'); Prompt(path);
1011 267 2          Curxy(path, 0, 13); Write(path, 'F5'); Prompt(path);
1012 288 2          Curxy(path, 0, 14); Write(path, 'R4'); Prompt(path);
1013 309 2          Curxy(path, 0, 15); Write(path, 'E'); Prompt(path);
1014 328 2          Curxy(path, 0, 16); Write(path, 'Q3'); Prompt(path);
1015 349 2          Curxy(path, 0, 17); Write(path, 'U'); Prompt(path);
1016 368 2          Curxy(path, 0, 18); Write(path, 'E2'); Prompt(path);
1017 389 2          Curxy(path, 0, 19); Write(path, 'N'); Prompt(path);
1018 408 2          Curxy(path, 0, 20); Write(path, 'C'); Prompt(path);
1019 427 2          Curxy(path, 0, 21); Write(path, 'Y1'); Prompt(path);
1020 459 2          Curxy(path, 0, 22);
1021 456 2          Write(path, ' 0      4      8      12      16      20      24');
1022 472 2          Prompt(path);
1023 475 2          Curxy(path, 0, 23);
1024 481 2          Write(path, ' HOUR ');
1025 495 2          Prompt(path);
1026 498 2          y := 175 - Round(Log10(results[24]) * 100);
1027 525 2          Setdptr(path, 16, y);
1028 531 2          FOR loopcount := 1 TO 24 DO BEGIN
1029 545 3              x := 16 + (loopcount * 15);
1030 551 3              y := 175 - Round(Log10(results[loopcount]) * 100);
1031 581 3              Line(path, x, y);
1032 587 3          END;
1033 601 2          Fcolor(path, 003);
1034 606 2          y := 175 - Round(Log10(0.85*results[24]) * 100);
1035 638 2          Setdptr(path, 16, y);
1036 644 2          FOR loopcount := 1 TO 24 DO BEGIN
1037 658 3              x := 16 + (loopcount * 15);
1038 664 3              y := 175 - Round(Log10(0.85*results[loopcount]) * 100);
1039 701 3              Line(path, x, y);
1040 707 3          END;

```

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```

1041 721 2 Fcolor(path, $01);
1042 726 2 y := 175 - Round(Log10(1.15*results[24]) * 100);
1043 758 2 Setdptr(path, 16, y);
1044 764 2 For looptount := 1 To 24 DO BEGIN
1045 780 3 x := 16 + (loopeount * 15);
1046 786 3 y := 175 - Round(Log10(1.15*results[loopeount]) * 100);
1047 823 3 Linem(path, x, y);
1048 829 3 END;
1049 843 2 Fcolor(path, $02);
1050 848 2 Curon(path);
1051 852 2 END;
1110 1222 3 FOR loop2 := 1 TO 47 DO
1054 0 1 (*
1055 0 1 * Printmuf - print results on printer.
1056 0 1 *)
1057 0 1 PROCEDURE Printmuf(VAR path : text);
1058 0 1
1059 0 1 VAR
1060 0 1 loop1, loop2 : Integer;
1061 0 1 x, y : Integer;
1062 0 1 oft, hpf, muf : real;
1063 0 1 graph : ARRAY [1..80, 0..48] OF char;
1064 -3943D 1
1065 -3943D 1 BEGIN
1066 0 2 Rawrite(path, printpath);
1067 12 2 Writeln(path); Writeln(path); Writeln(path);
1068 48 2 Writeln(path, title); Writeln(path);
1069 78 2 Writeln(path, ' Prediction for: ', name);
1070 102 2 IF (call[1] <> Chr(0)) THEN
1071 117 3 Writeln(path, ' ', call);
1072 141 2 Writeln(path);
1073 150 2 Writeln(path, ' Data: ', day:2;0, ' ', moname:3, ' ');
1074 202 2 Writeln(path, 'SSN: ', ssnapor:3;0, ' Flux: ', flux:3;0);
1075 251 2 Writeln(path, ' To: ', acntent, ' {', ecity, ' ', onetry, '}', ' ');
1076 326 2 Writeln(path, 'Lat: ', olat:6;2, ' Lon: ', olon:7;2);
1077 375 2 Writeln(path);
1078 384 2 Writeln(path, ' HOUR OFT(MHZ) MUF(MHZ) HPF(MHZ)');
1079 400 2 Writeln(path, ' HOUR OFT(MHZ) MUF(MHZ) HPF(MHZ)');
1080 421 2 FOR loop1 := 1 to 12 DO BEGIN
1081 435 3 loop2 := 12 + loop1;
1082 439 3 oft := 0.85 * results[loop1];
1083 465 3 hpf := 1.15 * results[loop1];
1084 491 3 Writeln(path, loop1:9, ' ', oft:6;1, results[loop1]:9;1, hpf:9;1);
1085 557 3 oft := 0.85 * results[loop2];
1086 583 3 hpf := 1.15 * results[loop2];
1087 609 3 Writeln(path, loop2:11, ' ', oft:6;1, results[loop2]:9;1, hpf:9;1);
1088 678 3 END;
1089 692 2 Writeln(path, Chr($13), Chr($10), Chr($30));
1090 726 2 FOR loop1 := 0 TO 48 DO
1091 741 3 FOR loop2 := 1 TO 80 DO
1092 756 4 graph[loop2, loop1] := ' ';
1093 809 2 FOR loop1 := 0 TO 6 DO BEGIN
1094 823 3 y := 8 * loop1;
1095 827 3 FOR loop2 := 1 TO 80 DO
1096 842 4 graph[loop2, y] := '-';
1097 879 3 END;
1098 893 2 graph[1, 0] := '1'; graph[15, 0] := '2'; graph[24, 0] := '3';
1099 932 2 graph[30, 0] := '4'; graph[35, 0] := '5'; graph[39, 0] := '6';
1100 973 2 graph[42, 0] := '7'; graph[45, 0] := '8'; graph[48, 0] := '9';
1101 1015 2 graph[50, 0] := '1'; graph[51, 0] := '0'; graph[65, 0] := '2';
1102 1060 2 graph[66, 0] := '0'; graph[74, 0] := '3'; graph[75, 0] := '0';
1103 1102 2 FOR loop1 := 2 TO 10 DO BEGIN
1104 1116 3 x := Round(log10(loop1)*50);
1105 1120 3 FOR loop2 := 1 TO 47 DO
1106 1143 4 graph[x, loop2] := '|';
1107 1180 3 END;
1108 1194 2 FOR loop1 := 2 TO 3 DO BEGIN
1109 1208 3 x := Round(log10(10*loop1)*50);
1110 1237 4 graph[x, loop2] := '|';
1111 1274 3 END;
1112 1289 2 FOR loop1 := 1 TO 47 DO BEGIN
1113 1304 3 graph[1, loop1] := '|';
1114 1322 3 graph[80, loop1] := '|';
1115 1341 3 END;
1116 1355 2 graph[1, 8] := '4'; graph[1, 16] := '8'; graph[1, 24] := '1';
1117 1394 2 graph[2, 24] := '2'; graph[1, 32] := '1'; graph[2, 32] := '6';
1118 1435 2 graph[1, 40] := '2'; graph[2, 40] := '0'; graph[1, 48] := '2';
1119 1477 2 graph[2, 48] := '4';
1120 1491 2 x := Round(log10(1.15*results[24])*50);
1121 1519 2 graph[x, 0] := '0';
1122 1539 2 graph[x, 48] := '0';
1123 1558 2 x := Round(log10(0.85*results[24])*50);
1124 1586 2 graph[x, 0] := '*';
1125 1604 2 graph[x, 48] := '*';
1126 1623 2 x := Round(log10(results[24])*50);
1127 1644 2 graph[x, 0] := '*';
1128 1662 2 graph[x, 48] := '*';
1129 1681 2 FOR loop1 := 1 TO 23 DO BEGIN
1130 1695 3 y := 2 * loop1;
1131 1699 3 graph[Round(log10(1.15*results[loop1])*50), y] := '0';
1132 1753 3 graph[Round(log10(0.85*results[loop1])*50), y] := '*';
1133 1811 3 graph[Round(log10(results[loop1])*50), y] := '*';
1134 1858 3 END;
1135 1872 2 FOR loop1 := 0 TO 48 DO BEGIN

```



```

1137 1887 3      FOR loop2 := 1 TO 89 DO
1138 1992 4          Write(path, graph[loop2,loop1]);
1139 1949 3          WriteLn(path);
1140 1958 3      END;
1141 1972 2      WriteLn(path, Chr($1B), Chr($36), Chr($14));
1142 2006 2      Page(path);
1143 2009 2      Close(path);
1144 2012 2      END;
1147 0 1  (*)
1148 0 1  * Dosgain - is another prediction desired?
1149 0 1  *
1150 0 1  PROCEDURE Dosgain(VAR path : cex);
1151 0 1
1152 0 1  BEGIN
1153 0 2      Write(path, 'Do another MUF prediction (Y/N)? ');
1154 14 2      Prompt(path);
1155 17 2      Reset(path);
1156 27 2      ReadLn(path, answer);
1157 37 2      Rewrite(path);
1158 47 2      END;
1161 0 1  BEGIN
1162 0 1      mo[1] := 31; mo[2] := 28;
1163 69 1      mo[3] := 31; mo[4] := 30;
1164 91 1      mo[5] := 31; mo[6] := 30;
1165 113 1      mo[7] := 31; mo[8] := 31;
1166 133 1      mo[9] := 30; mo[10] := 31;
1167 157 1      mo[11] := 30; mo[12] := 31;
1168 179 1      moarray[1] := 'JAN'; moarray[2] := 'FEB';
1169 205 1      moarray[3] := 'MAR'; moarray[4] := 'APR';
1170 231 1      moarray[5] := 'MAY'; moarray[6] := 'JUN';
1171 238 1      moarray[7] := 'JUL'; moarray[8] := 'AUG';
1172 284 1      moarray[9] := 'SEP'; moarray[10] := 'OCT';
1173 310 1      moarray[11] := 'NOV'; moarray[12] := 'DEC';
1174 336 1      princout := FALSE;
1175 341 1
1176 341 1      Rewrite(screen, window);
1177 353 1      Dvsec(screen, 7, 0, 0, 80, 24, 0, 1, 1);
1178 368 1      Fonc(screen, 200, 1);
1179 378 1      Select(screen);
1180 384 1
1181 384 1      Logo(screen);
1182 390 1      Header(screen);
1183 396 1      WriteLn(screen, 'Initializing program ...');
1184 411 1      Init;
1185 414 1      REPEAT
1186 414 1          Menu(screen);
1187 420 2          Getdat(screen);
1188 426 2          Askabort(screen);
1189 432 2          UNTIL ((answer = 'Y') OR (answer = 'y'));
1190 448 1          Wncprnc(screen);
1191 454 1          Compuf(screen);
1192 460 1          Showmuf(screen);
1193 466 1          Graphmuf(screen);
1194 472 1          IF princout THEN
1195 478 2              Princmuf(prntr);
1196 484 1          Dosgain(screen);
1197 490 1          Ownd(screen);
1198 496 1          WHILE ((answer = 'Y') OR (answer = 'y')) DO BEGIN
1199 515 2              REPEAT
1200 515 2                  Header(screen);
1201 521 3                  Write(screen, 'Use some geographic area for prediction (Y/N) ');
1202 533 3                  Prompt(screen);
1203 538 3                  Reset(screen);
1204 550 3                  ReadLn(screen, answer);
1205 562 3                  Rewrite(screen);
1206 574 3                  IF ((answer = 'N') OR (answer = 'n')) THEN
1207 590 4                      Menu(screen);
1208 596 3                  Write(screen, 'Use some date and Snapshot/Flux number (Y/N)? ');
1209 608 3                  Prompt(screen);
1210 613 3                  Resc(screen);
1211 625 3                  ReadLn(screen, answer);
1212 637 3                  Rewrite(screen);
1213 649 3                  IF ((answer = 'N') OR (answer = 'n')) THEN
1214 665 4                      Gccdec(screen);
1215 671 3                  Askabort(screen);
1216 677 3                  UNTIL ((answer = 'Y') OR (answer = 'y'));
1217 693 2                  Wncprnc(screen);
1218 699 2                  Compuf(screen);
1219 705 2                  Showmuf(screen);
1220 711 2                  Crsphmuf(screen);
1221 717 2                  IF princout THEN
1222 723 3                      Princmuf(prntr);
1223 729 2                  Dosgain(screen);
1224 735 2                  Ownd(screen);
1225 741 2      END;
1226 744 1  END.

```

PROC NAME	PSEC	PSIZE	LOCAL	STACK	CSEC	CSIZE
0 SKIPMUF	74	761	821	25	77	211
1 DWSET	1	86	2	12	2	0
2 FONT	2	38	2	12	3	0
3 SELECT	3	21	2	12	4	0
4 DWSET	4	78	2	12	5	0
5 CUROFF	5	21	2	12	6	0
6 SCALESW	6	28	2	12	7	0

7 SETDPTR	7	74	10	12	8	0
8 BOX	8	74	10	12	9	0
9 LINE	9	74	10	12	10	0
10 CURRY	10	41	2	12	11	0
11 LINEM	11	74	10	12	12	0
12 FCOLOR	12	28	2	12	13	0
13 GURON	13	21	2	12	14	0
14 OWEND	14	21	2	12	15	0
15 LOG10	16	137	17	17	17	0
16 NORM	15	76	2	17	16	0
17 CLUSCRN	17	20	2	13	18	0
18 LOGO	18	234	32	13	19	354
19 HEADER	21	26	4	13	22	54
20 INIT	23	292	4	18	25	12
21 MENU	26	967	36	19	30	117
22 GETDAT	31	712	36	22	34	459
23 ASKABORT	36	291	20	16	38	125
24 WANTPRNT	39	75	5	15	40	54
25 HOURMUF	46	1927	160	17	54	0
26 ACS	41	39	5	27	42	0
27 RPOWER	42	49	5	17	43	0
28 CHECKVAL	43	68	0	18	44	0
29 SCN	44	76	5	17	45	0
30 MINUSEXP	45	41	5	27	46	0
31 COMPMUF	34	230	58	39	55	22
32 SHOWMUF	56	242	18	16	57	41
33 GRAPHMUF	58	853	38	23	62	86
34 PRINTMUF	63	2013	3983	18	71	231
35 DOAGALN	72	48	4	13	73	33
		9856	5320	594		1821

1226 Lines of source code compiled with no errors found

Actual Heap = 7863
 Actual Stack = 4428
 Free Memory = 3657

Hint...

Handy Work Window

Using the overlay window command, DWSET, in a couple of short procedures, a "work window" can be opened over the top of OS-9 or BASIC09 screens where there is work underway. Such a nondestructive window takes on the characteristics of the window it overlays — that is, it opens with either the OS-9 or the BASIC09 prompt. BASIC09 is used to create the two procedures:

```

PROCEDURE ww
RUN gfx2("DWSET",1,2,2,30,
20,2,0)
RUN gfx2("BOLDSW","DN")
PRINT "Work window. . ."
RUN gfx2("BOLDSW","OFF")
END

```

```

PROCEDURE qww
RUN gfx2("DWEND")
END

```

The procedures are then saved under the name of the first: save* ww, and subsequently packed: pack* ww.

The final step is to edit the startup file by adding load ww to whatever else is found in it. On a 512K machine, runb and gfx2 should also be added to startup to get quick response from the work window call. At the OS-9 prompt you merely type ww and press ENTER, or type qww and press ENTER to exit to your main window. If at the BASIC09 prompt, then \$ww or \$qww would be needed.

Del Turner
 Kamloops, BC

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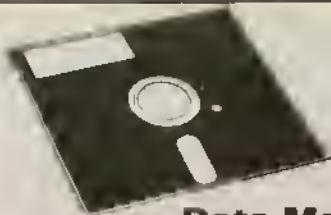
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New Features Added to Data Master!!

- **Data Merge capability** to interface with our OS-9 Text Formatter - perfect for using data master information imbedded in letters, forms, and more!
- **Expanded file list display** capabilities make it easier to scan through your data files.

Update for current users:

Data Master users can receive this new version by ordering "Data Master Update" for only \$10. (Data Master registration card must be on file!)



Data Master

by BJ Chambless

Simplify with pull-down menus

All options are available from anywhere in the program. To make it even simpler, each menu option can be invoked by a single character!

Dialog boxes

Pop-up windows display current settings and available choices.

Unique LIST display format

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For even more power, use an access key to selectively display a subset of records and can change them right on the screen!

Compatibility with OS-9 Profile & Data Bank

You won't lose any of your valuable data!

Easy Expansion

with re-definition of records and transfer of files.

Elements & Records:

Each record can contain up to 512 characters used within 35 elements. Elements are defined as: alphanumeric (descriptive data), math (real numbers including dollars & cents), date, and derived (formulas calculated from other elements in the same record). You can store any type of data using these field types!

Display & Entry Screens

Design up to 9 different screen formats for data display and data entry for each data base. This is helpful for accessing your data for different purposes.

Sorts & Selections:

Up to 9 different access keys can be defined. These are used for displaying data on the screen or selecting data for printing. You may use several levels of sorts as well as logical operators to select just the right data. A powerful generic search is also available.

Reports:

See your data any way you want by designing your own reports! Data Master offers easy-to-use tools to design professional reports including report headings, titles, column headings, automatic page numbers, column totals, and more. Store up to 9 report formats for each data base.

File Management

Built-in file management capabilities allow easy file manipulation for transferring data files, renaming data files, expanding data files, and more.

Upload/Download

Data Master can read and write standard sequential files which aids in data transfer between DynaCalc and many others.

Full keyboard ease

taking full advantage of the CoCo 3's cursor and function keys.

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Requires OS-9 Level II,

CoCo 3, 512K

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by John & Michael Galus

The German invasion of Russia began at 0300 on 22 June 1941. Two massive armies faced each other in a titanic struggle which would decide World War II. The object of IRON CROSS is to defeat the Russian forces controlled by the computer & to take control of the Russian cities.

Requires 64K, Ext. Basic, Disk. \$24.95



Screen Star

by Scott Cabit

Also available from Radio Shack through Express Order Software

Screen Star implements the popular WordStar editing capabilities. If you know WordStar you already know how to use Screen Star!

- **Edit files larger than memory** since Screen Star uses the disk as an extension of memory.
- **Block Commands** - with a keystroke you can mark the start and end of a block, then move, copy, or delete the block.
- **Cursor Movement** is easy with an array of commands to move left or right one character, or one word, or one line; scroll forward or back one line, one screen, one block; jump to the start or end of the line or the screen, block, or file.
- **Find & Find/Replace Commands** make mass changes and searches a snap.
- **Pop-Up Help Menus** are as close as a keystroke.

- **Closing Commands** let you exit the editor with or without save, and can import or export files whenever you need them.
- **Smart Speller** is included.
- **Parameter commands** personalize your environment.
- **Access the OS-9 Shell.**
- **Up to 10 functions keys** can be defined by CoCo 3 users for fast, repetitive functions.
- **Use with the Text Formatter** for a full word processing team. Simply imbed the Text Formatter commands in your Screen Star file and it will be printed in style!
- **Level 1 & Level 2** are supported and both versions are included.

Requires OS-9 Disk
With Text Formatter

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OS-9 Text Formatter

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Requires OS-9

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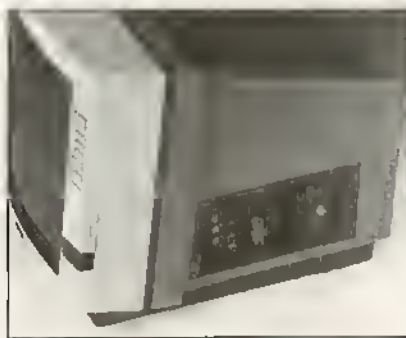
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1

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- income averaging
- income splitting
- tax shelter



Which?

1 sister



2 smaller

One-syllable adjectives that
end in **y** usually just add **ly**



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1 icy

2 sly

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This fascinating CoCo 3 game continues to be one of our best sellers. Pyramix is 100% machine language written exclusively to take advantage of all the power in your 128K CoCo 3. The Colors are brilliant, the graphics sharp, the action fast. Written by Jordon Tavetkoff and a product of Color-Venture.

The Freedom Series

Vocal Freedom

I've got to admit, this is one nifty computer program. Vocal Freedom turns your computer into a digital voice or sound recorder. The optional **Hacker's Pac** lets you incorporate voices or sounds that you record into your own BASIC or ML programs. This is not a synthesizer. Sounds are digitized directly into computer memory so that voices or sound effects sound very natural. One "off-the-shelf" application for Vocal Freedom is an automatic message-minder. Record a message for your family into memory. Set Vocal Freedom on automatic. When Vocal Freedom "hears" any noise in the room, it

Dr. Preble's Programs

For Color Computer Software Since 1983

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